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An Analysis of IT/IS Offshore Outsourcing: Educator Perspectives

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An Analysis of IT/IS Offshore Outsourcing: Educator Perspectives

by

Martin H. Bagaya

A dissertation
submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in
Information Systems

Graduate School of Computer and Information Sciences
Nova Southeastern University

2007

We hereby certify that this dissertation, submitted by Martin H. Bagaya, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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Graduate School of Computer and Information Sciences
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2007

An Abstract of a Dissertation Submitted to Nova Southeastern University in Partial
Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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IT/IS Offshore outsourcing is defined as a commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client. This process of offshore outsourcing to overseas locations was perceived to have consequences on IT/IS student enrolment at U.S. universities.

The objective of this study was to identify administrators' responses to reduced IT/IS student enrolments. The majority of IT/IS college administrators have concerns about offshore outsourcing, and is perceived to reduce student enrolments. Ninety-five percent of the universities experienced enrolment declines after the year 2000. The dotcom bubble burst, offshore outsourcing and media talk on lost jobs were the perceived main causes. Some universities have taken remedial steps; marketing IT/IS to high school students, getting the IT industry involved, and seeking government funding.

The research questions for this study include: What are the concerns in U.S. universities due to IT/IS offshore outsourcing, in relation to interest and enrolment by students in IT/IS programs? What are the prevailing consequences of IT/IS offshore outsourcing on undergraduate training for IT/IS programs? What are the specific changes in IT/IS university programs that can be attributed to IT/IS offshore outsourcing? This study was conducted by running interviews with college administrators (Dean or Head of Department) in U.S. Universities. A total of twenty randomly selected universities voluntarily participated in this research. The interview transcripts were validated for content with the respondents through email feedback.

The following are recommended actions; implementing curriculum reviews, redefining departmental marketing strategies for new students, advocating for government funding, advertisements in news media, and seeking IT industry plus professional organizations' assistance. It is recommended that IT/IS training be focused on offshore-proof skills. Some of the training skills include: bio-informatics, nano-technology, double majors, offshore business management, teamwork participation, forensic technology, security, and data mining. According to the department of labor and statistics, the projected job growth for IT/IS careers is excellent. Universities can leverage on this message and promote student interest.

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Chapter 1

Introduction

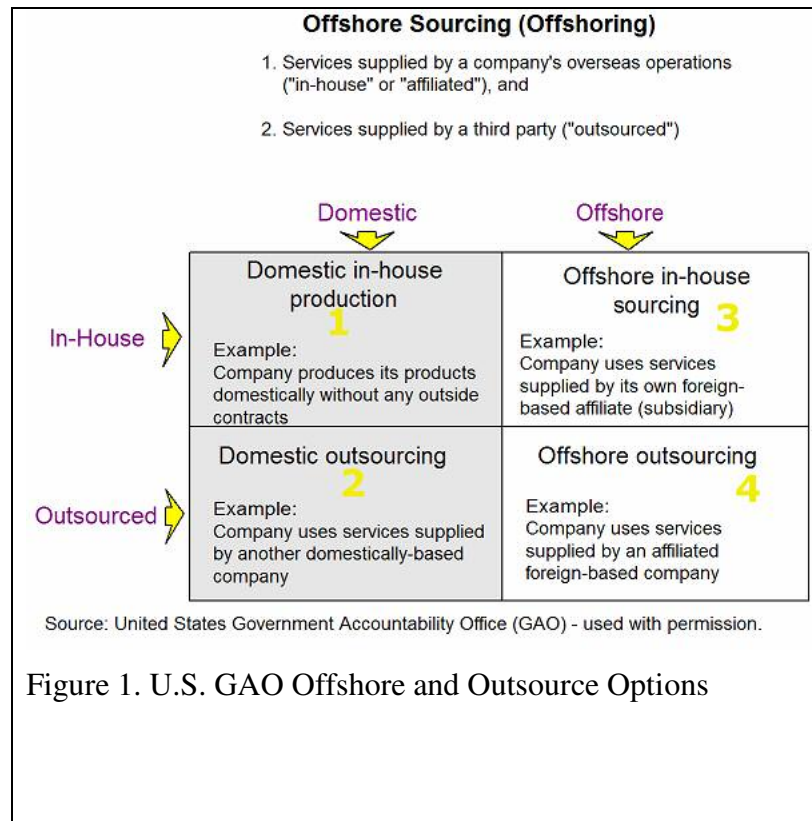
Chapter one provides the background and definition for offshore outsourcing. It defines the goals and the problem statement for this research. Three research questions are introduced in this chapter. The limitations, delimitations, barriers and issues are discussed here. Included in this chapter is an outline of the significance for this study. A definition of terms and chapter summary are provided at the end.

Background

“Offshoring generally refers to an organization replacing services produced domestically with imported services.” (United States Government Accountability Office, 2004, p. 1). This is a United States Government Accountability Office definition for offshoring. The United States Government Accountability Office (GAO) depicts offshoring and outsourcing in four areas shown in Figure 1.

The United States GAO has four categories of a company’s labor force (see Figure 1). These are: 1) domestic in-house labor 2) domestic locally outsourced labor 3) offshore outsourced subsidiary and 4) offshore outsourced labor through an offshore provider (or vendor). An increasing labor pool of information technology / information system (IT/IS) professionals in category 3 and 4, have created concerns to IT/IS college

administrators. This dissertation research investigated offshore outsourcing implications related to categories 3 and 4 of the IT/IS workforce in U.S. firms.



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 Source: <http://www.gao.gov/new.items/d04932.pdf>

Offshore Outsourcing Definitions

Offshore outsourcing has been given many names and several definitions. Yalaho, Nahar, Käkölä, and Wu (2005), who call offshore outsourcing international outsourcing, provide this definition: “International outsourcing refers to a commercial arrangement, where a contractor entrusts a foreign subcontractor with a commission to produce the software products or services.” (p. 1). This is a practice of looking outside the firm for foreign vendors, from a different country, and with the capability to subcontract services originally performed in-house, or may have been outsourced domestically. The subcontractor produces the software product or services, and at the same time delivers to

the consumer with payment. Offshore outsourcing involves the commissioning of a third party in the management and development of a client's IT/IS assets and activities to some set standards. Benamati and Rajkumar (2002) refer to outsourcing as the transfer of some of a company's Information Technology / Information Systems (IT/IS) functions to an outside party. Offshore outsourcing is the transfer of work on some IT/IS functions to another country.

In this dissertation, the IT/IS Offshore Outsourcing definition is described as follows: IT/IS Offshore outsourcing is a commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client (a U.S. firm, company or organization that consumes or uses IT/IS products and services).

The above IT/IS Offshore outsourcing definition is targeted for an IT/IS worker. The relationship an IT/IS worker has with this research is based on the main source for the U.S. IT/IS workers, which are the colleges and universities training students in IT/IS career programs. The U.S. Department of Commerce, Economics and Statistics Administration provide a definition for an information technology worker in the digital economy report of 2003 as:

IT workers develop, design, manufacture, operate, repair, and maintain the IT infrastructure that supports ecommerce, the internet or network related activity, and IT enabled processes through business and organizations. Four major IT producing industries are computer hardware, software and computer services, communications equipment, and communications services. (Cooke 2003, p. 19)

IT/IS Workers are generated from two main sources, local U.S. graduates in IT/IS programs and graduates from the rest of the world, which includes offshore nations. This is depicted in Figure 2.

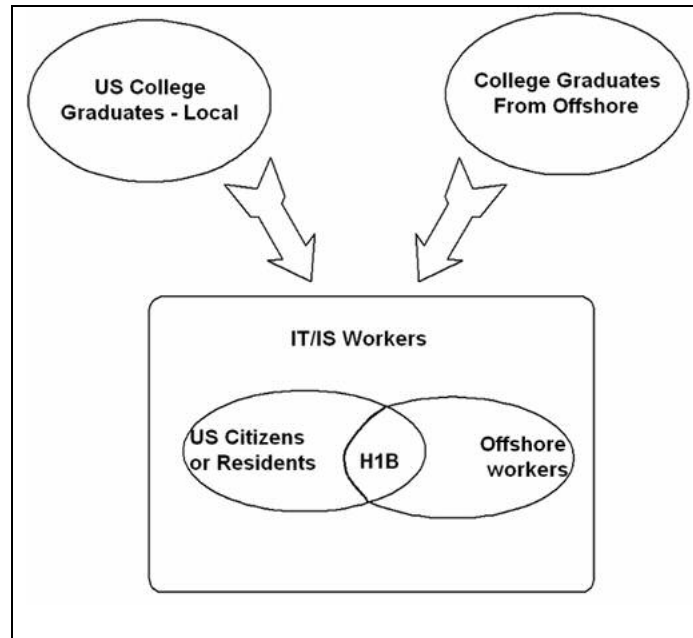


Figure 2. Global IT/IS Workers

IT/IS workers, most of whom are graduates from IT/IS programs in U.S. universities, get hired in different occupations by technology or related firms. Table 1 shows some of the IT/IS related occupations divided in moderate and high skill levels. These occupations are continually being outsourced offshore and therefore raising a negative perception on job availability for future IT/IS college graduates.

Table 1. IT/IS Related Occupations

High Skill Level	Moderate Skill Level
Computer programmers	Data entry keyers
Computer software engineers, systems software	Computer, automated teller,
Computer systems analysts	Telecommunications equipment installers
Network and computer systems administrators	Electrical and electronics repairers
Network systems and data communications analysts	Semiconductor processors
Computer software engineers, applications	Communications equipment operators
Computer support specialists	Computer operators
Database administrators	Billing and posting clerks
Computer hardware engineers	

Source: Information Technology Workers in a Digital Economy (Cook, 2003 p. 6)

Why Firms Outsource Offshore

The late 1990s were characterized by industry lobbying congress for increased quotas of foreign workers with H1B visas to fill vacant IT/IS jobs (McManes, 2003). It is now apparent that U.S. IT/IS jobs (see Table 1) are being filled by low wage earners from other nations offshore. Niederman (2004) suggests that this trend highlights two questions:

1. What are the prospects for the global information technology workforce in the near and longer term?
2. How will information technology jobs be distributed among competing labor markets around the world?

Whereas the first question addresses the total IT/IS job market demand globally, the second question raises issues about how government, universities and individuals will successfully compete globally. The demand for U.S. IT/IS workers in the 1990s exceeded

supply (Frolick, Chen, & Janz, 2005). The literature suggests that labor shortages existed by 1999, with rising wages for IT/IS workers, and also unfilled job positions. However, unemployment for U.S. IT/IS professionals rose to unprecedented levels by the end of 2004 (See Figure 3). This unemployment concern has been strong such that the foreign worker H1B visa program has been subjected to opposition (Hira, 2003a). Figure 3 shows the estimated demand for new IT/IS workers from 2000 to 2004 dropped significantly. The expected demand peaked in 2000 at 1,600,000 and fell to below 250,000 by 2004. An information technology association study conducted through Global insight found that approximately one hundred thousand computer service jobs were moved offshore since the year 2000. These jobs include newly created positions and those that were terminated within the U.S. (Information Technology Association of America, 2004).

Companies conduct intensive searches to hire well-trained and skilled IT/IS professionals. These companies struggle to retain the skilled IT/IS professionals after their recruitment. A labor shortage problem is created if companies fail to retain their experienced IT/IS employees. The rate of change in new technologies tends to compound the problem. Therefore, an emerging alternative to address this shortfall is the engagement of offshore outsourcing services (Benamati & Rajkumar, 2002).

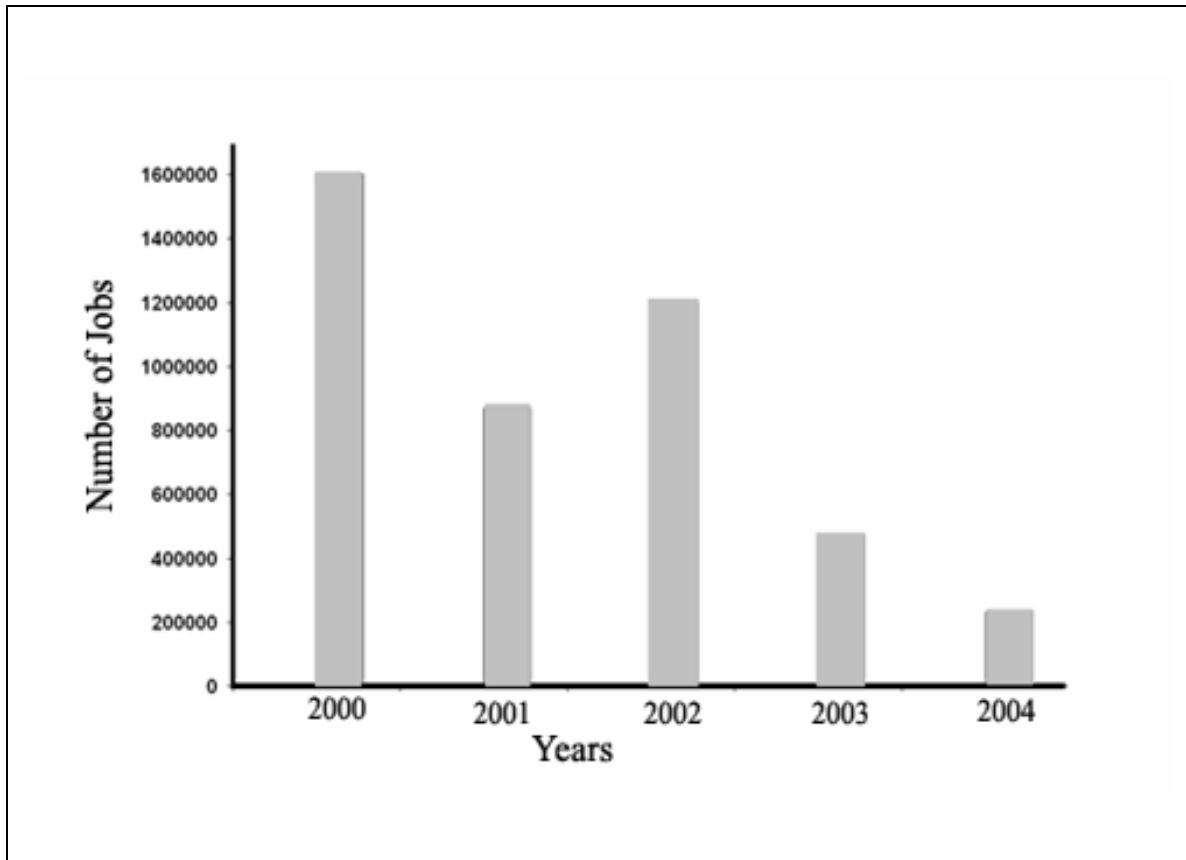


Figure 3. IT/IS Job Availability 2000 – 2004

Copyright © 2004 Information Technology Association of America. Used with permission, p. 10. Source: <http://www.ita.org/workforce/docs/04workforcestudy.pdf>

The offshore outsourcing trend seems to suggest that a shortage of skills exists in the U.S., and a lack of certain competencies as well. To compensate for this shortfall, U.S. firms resort to foreign IT/IS workers offshore. If software development is not improved and maintained at home in the U.S., then it will not be a core competency for U.S. IT/IS professional workers (Fraser, Anderson, Crocker, Gabriel, Fowler, & Lopez, 2004). Therefore company executives have outsourced software development and design in order to create a greater product value from overseas, and at a reduced cost.

Offshore outsourcing provides a compelling alternative to high U.S. salaries due to the cheap labor costs from overseas. Causes of offshore outsourcing can be due to

implementation of new and favorable economic measures in target offshore countries, strategic business concerns or particular technical drivers (Lee, Huynh, Chi-wai, & Pi, 2000). It costs less to hire an outside offshore expert compared to developing one in-house. It is easier to terminate externally hired experts (such as offshore outsourced workers) than local permanent staff. The use of offshore-outsourced services enables organizations to focus on streamlining and enhancing their core competencies. Offshore workers are then utilized to implement non-core IT/IS solutions (Benamati & Rajkumar, 2002).

Offshore outsourcing provides IT/IS firms with a possibility to divide work across national borders. Reich and Nelson (2003) document a two-tier process for global IT/IS offshore outsourcing. In this process, a firm used the local IT/IS people to develop specifications, which had to be more precise and of greater quality than those typically done before the offshore outsourcing engagement, and then have the offshore people do the development. This in effect propagates the IT/IS functionality to analysis and less of a development orientation for the local "U.S." staff. This approach recognizes that distant locations and a lack of close proximity between the customer and development team, can operate better with a reduced need for frequent communication. To achieve this objective, the requirement specifications must be made with greater accuracy to minimize the number of contacts needed to clarify and resolve problems. This enhances process efficiency by reducing communication delays between offshore developers and writers of the requirement specifications or the end user customers.

The Influence on IT/IS Colleges

Computer science programs once viewed by students as a ticket to wealth are now seen as a path to unemployment (Foster, 2005). Existing data suggest that student interest in the profession is undergoing a free fall. The Computing Research Association (representing computer scientists in industry and academia) indicates that new computer science majors have declined 32% from the fall of 2000 to fall 2004. Incoming freshmen expressing interest in computer science majors has plummeted by nearly 60% over the previous four years (Foster). Field researchers require intellectual talent to fuel future scientific breakthroughs, and technology companies need recruits to fill vacant positions. This lower enrolment trend in college students for IT/IS programs is worrisome for both industry and academicians.

Undergraduate students and computer scientists attribute the stigma surrounding the offshore outsourcing phenomena to media outbursts (Foster, 2005). Some computer savvy students are choosing to pursue other illustrious fields for example bio-informatics, molecular biology and biochemistry. Microsoft has acknowledged a short supply for new hires and raised the concern to lawmakers on the reduced student interest in computer science and engineering. The information technology association has gone on a campaign to stimulate universities in producing graduates with the needed and relevant soft skills like project management, communication and business acumen. The minority groups, for example women, have had a much reduced college freshman intake by as much as 80% from 1998 to 2004 (Foster).

Offshore outsourcing has created an environment where the market demand for IT/IS graduates is rapidly changing. The circumstances and forces behind this change

have a global perspective. They present a challenge to the U.S.'s historical lead in high-tech innovation, the software and hardware services delivery to both within and outside her boundaries.

Some university educators and administrators have taken offshoring seriously and responded to the undesirable offshore outsourcing influences on student enrolment. The issues IT/IS offshore outsourcing raises touch many policy, administrative and legislative levels of government, private sector, industry and academia. The confidence that training for an IT/IS profession in college is a rewarding and stable career for a long time to come is important to any prospective student.

If there are not enough students enrolled in scheduled classes in IT/IS, the need for expanded faculty will diminish and may even lead to layoffs (Frolick, Chen, & Janz, 2005). It is also true that if the U.S. universities cannot produce enough IT/IS graduates for high-tech and software firms, then there is a likelihood for a ripple effect to business, and the economy overall (Witman, 2005).

Problem Statement and Goals

Problem Statement

Offshore outsourcing in IT/IS to overseas locations is perceived to have undesirable consequences to IT/IS student enrolment at colleges and universities (Ferguson, Kussmaul, McCracken & Robbert, 2004). Offshore outsourcing has stimulated certain changes on the IT/IS educational system, the extent of these changes are difficult to assess. The discussions and literature on offshore outsourcing is mainly focused on the IT/IS industry firms or employers. Until this study was conducted, there

was little information on how this phenomenon has been perceived and responded to in academia. University administrators in IT/IS college programs are at the center of consequences and resulting changes from offshore outsourcing. As IT/IS offshore outsourcing increases, educators can expect questions from students about IT/IS job availability after graduation. IT/IS departmental heads and deans are faced with a situation of designing undergraduate courses that attract new students and also maintains those that are enrolled. This course training is needed to provide assurance to students that they receive an education with necessary skills to overcome the competition created by offshore-outsourced job positions in IT/IS.

Goals

This research was designed to empirically determine the concerns, changes and consequences of the job-market loss problem due to offshore outsourcing, from the IT/IS educator's perspective. In this study, the researcher determined the perceived relationship of offshoring to student enrolment declines or lack of interest in IT/IS programs. The researcher also identified changes the universities have implemented as a result of the growing trend in IT/IS offshore outsourcing. In addition to these outcomes recommendations were made.

Using structured interviews, this research identified intervention measures made by administrators on training delivery mechanisms in response to reduced enrolments, and offshore outsourcing. What the researcher has achieved in this study is developing an understanding of how administrators are acting to stimulate student interest in IT/IS careers. The researcher has established that the issues have expanded beyond university campuses, to places like high schools, IT industry, and state or federal government

support. The investigation process involved interviewing college administration in IT/IS programs. The participating universities were randomly selected from the U.S. Northeast and Southern regions. The collected information was compiled in chapter four of this report. The conclusions, implications, possible recommendations and guidelines for future research are given in chapter five.

Significance

With a shrinking IT/IS job market caused by offshoring, how far and to what extent this trend will continue is debatable, but a significant level of uncertainty was evident. This job uncertainty carries with it direct consequences on people with careers in IT/IS, and also those students who have the intention of pursuing a career in IT/IS. If prospective IT/IS students change their career paths to something other than IT/IS, this trend discourages high school graduates from pursuing IT/IS training and hence lower the number of future graduates available for hire. If this shortage is felt by the IT/IS industry, they might “aggressively” seek offshoring more jobs overseas due to the shortage, and hence escalate the shortfall in IT/IS graduating students.

Some of the services being outsourced include software development, health care transcription and medical information processing, systems analysis, and more. The technology enabled outsourcing phenomenon has left an un-skilled job competition of low paying IT/IS job positions between fresh graduates and those IT/IS career professionals affected in this displacement (Weinstein, 2004). The initial impact created by offshore outsourcing is attributed to loss of individual income, and hence an economic loss to the country in taxes. Exceptional students with a substantial interest in IT/IS

programs are threatened by offshoring, and some consider changing to different careers other than in IT/IS. If this trend is left unchecked, it would therefore starve the IT/IS Industry of innovative, intelligent and creative minds that have maintained the U.S.'s competitive edge in IT/IS throughout the world (Kilbane, 2004).

Ferguson, Kussmaul, McCracken and Robbert (2004) suggest that unemployment in information technology / information systems has led to decreased computer science and IT/IS enrolment in U.S. universities. This study found evidence to support this statement (see chapter four). Software development and programming are neither rare, nor a specialized skill any longer. The rate at which manufacturing adopted offshore activities in the 1970's and 80s was much slower than what is happening to information systems (Ferguson, et al.). The offshore outsourcing trend in information systems is therefore presenting a new and compelling challenge in the training of skills for future U.S. IT/IS graduates. These graduates are needed to compete in a technology driven and transformed "global workplace". Talking about fresh hires of IT/IS graduates from college, a CIO had this to say:

When I look at the kids that are coming in, they're really, really smart and I can use them on the platforms, but they don't...understand the enterprise. You have to take technicians and teach them to ask questions before they just say yes or no or maybe to users. They need to be more business savvy...So that's been a big transition because generally, they aren't really interested in that topic. (Reich & Nelson, 2003, p. 38)

The above paragraph raises the bar for the kind of IT/IS graduate a chief technology office, or chief information officer is aspiring to hire: it is not just a kid that can develop the best algorithms, or write the most intelligent code. These are great attributes, but employers are looking for a graduate who also possesses business knowledge, with the ability to integrate business problems to practical technology

solutions, independent thinkers and intelligent communicators. IT/IS Students need to have the understanding of how technical decisions influence a business, and the impact they have on the corporate return on investment.

There is a high level of job skills in IT/IS services possessed by offshore providers. These job skills are available at competitive costs, lower than the American counterparts. This is enough to stimulate debate, and a review of the contemporary IT/IS education being offered in U.S. colleges and universities. The challenges presented by offshoring calls for extolling the virtues and values of a U.S. IT/IS graduate, having a better and unsurpassed competitive edge in the global IT/IS marketplace for jobs. In addition, information systems and information technology undergo a continuous change. As a result, the university IT/IS training needs frequent updating for it to be effective in meeting the new challenges (Davis, Gorgone, Couger, Feinstein, & Longenecker, 1997). The educational programs being offered require taking IT/IS students up on the value ladder in their career and future profession. It is imperative to recognize the availability of limited resources to achieving these objectives, and therefore precipitating the need for setting priorities in light of the competing demands for offering a valuable education to future graduates in IT/IS (Ho, 2004). Students need to be aware of the options and choices they have in an IT/IS program. This knowledge will help students in identifying career paths and strategies for entering the globally competitive job market. Concerns are raised if a perception is held by future or prospecting IT/IS graduates that computer programming is being auctioned out offshore to the lowest bidder. Those students intending to pursue an IT/IS career may get threatened. The results of this study suggest that this statement has credibility in academia.

Barriers and Issues

The scope of this empirical research investigation required a representative sample of colleges and universities within the United States. Universities have various student populations and sizes, plus different geographical and economic conditions. The national center for education statistics web page <http://nces.ed.gov/ipeds/cool>, lists 501 U.S. main land public universities and colleges that graduate 4-year degrees in computer science and/or information systems. These are universities with a student population of 5,000 and above. For this research, the U.S. was divided into four regions West, Midwest, South, and Northeast. Due to financial constraints, universities were randomly selected from a random choice of two regions. A random sample of twenty IT/IS university administrators were involved in the study (Gefen, Straub, & Boudreau, 2000; Lind & Mason, 1996; Neuman, 2003a).

The participation of college administrators was voluntary, and they were generated from randomly selected universities. The contacts with university administration and heads of departments was made through a combination of email, telephone and office visits. The initial contact with the respondents was done through email, or telephone, and including office visits. Getting emails and telephone contact information was not easy. However, the primary source of information was the university websites, whose URLs were available on the National Center for Education Statistics web page. The list had a total of 2,333 public universities (including universities with a total student population below 5,000), all graduating 4-year degrees in computer science and information systems.

Research Questions

Concerning insights into offshore outsourcing, Marcus (2004) raises three questions: "What is happening? How do we understand it? And what can we expect in the future?" (p. 14). These three questions are rephrased within the context of this proposal: What is happening in the U.S. colleges offering IT/IS classes? How can the administrators, and educators in IT/IS adjust to the consequences of the current offshore job market trends? How can the IT/IS educators train students for a mainly domestic future employment? How should their future IT/IS graduates be advised in respect of the prevailing globally oriented job market? The researcher specifically examined the following research questions:

1. What are the concerns in U.S. universities due to IT/IS offshore outsourcing, in relation to interest and enrolment by students in IT/IS programs?
2. What are the prevailing consequences of IT/IS offshore outsourcing on undergraduate training for IT/IS programs?
3. What are the specific changes in IT/IS university programs that can be attributed to IT/IS offshore outsourcing?

Limitations

The recent statistics on student enrolment, from both the U.S. Department of Education, National Center for Education Statistics, and Integrated Postsecondary Education Data System (IPEDS) was compiled in 2005, and for survey data collected in

2003-04. No national statistics from the U.S. Government later than 2004 is readily available (National Center for Education Statistics, 2005).

Offshore outsourcing in IT/IS and the direct effects on job losses in the United States is the responsibility of the department of commerce. At the time of this study, the department had never specifically addressed a separate aggregation of this data as an entity or cause. A GAO report on international trade (U. S. Government Accountability Office, 2004) states that: “U.S. government data provide some insight into the extent of services offshored by the private sector, but they do not provide a complete picture of the business transactions that the term offshoring can encompass.” (p. ii).

The offshore outsourcing trend is an ongoing process, it is projected to continue experiencing growth and expansion. There is a kind of offshoring that happens by companies growing their overseas subsidiaries. Therefore, instead of expansion of U.S. operations, the cheaper labor costs in a foreign country influence a decision to expand offshore. This kind of information is not expected to be available given the politics and sensitivity offshoring has been characterized with.

Delimitations

Outsourcing can be categorized in two main types: the first type is onshore-outsourcing (U.S. local individuals or firm(s) are hired), and the second type offshore-outsourcing (where a foreign firm(s) or individuals are hired). This research investigated U.S. university influences and perspectives caused by offshore outsourcing (or the second type). In this type, foreign IT/IS workers from other countries are hired by U.S. firms to work on projects or other IT/IS services. These are projects or services, which would

otherwise be done by local U.S. citizens or permanent residents. The discussions and research investigations were focused on offshore outsourcing, and not outsourcing in general. This therefore excluded a U.S. firm hiring another U.S. firm, or individuals residing within the United States for the same or similar work activities.

This research did not consider providing proven solutions to the problems of offshore outsourcing for universities, governments or industries involved in the process. However, there are recommendations in chapter 5, concerning possible ramifications for colleges and universities. Chapter five includes perspectives and approaches for increasing student interest and enrolment in IT/IS careers. It also provides some steps universities are taking to adjust to the offshore outsourcing phenomenon. This study has revealed offshore outsourcing consequences imposed on universities and colleges training students in IT/IS careers. The study results show how offshore outsourcing is understood, perceived, and interpreted in academia. A summary list of preferred means of responding to the offshore outsourcing student enrolment challenge is found in chapter four.

The United States is such a large country and has several geographic regions having varied economic backgrounds. Selection of the population sample involved usage of a stratified sample space from four U.S. regions; Northeast, South, Midwest and West. The minimum population criteria of 5,000 or more students was used during the selection process.

Acronyms

ACM	Association of Computing and Machinery
a.k.a.	Also known as
CIO	Chief Information Officer
CIS	Computer Information Systems
CS	Computer Science
DBA	Database administrator
IEEE	Institute of Electrical and Electronics Engineers
GAO	Government Accountability Office (for U.S. Government)
IRB	Institutional Review Board
IT/IS	Information Technology and/or Information Systems
ITAA	Information Technology Association of America
N/AV	Not available
NCES	National Center for Education Statistics
n.p.	No page number
n.d.	No date
pp.	page numbers “#-##”
p.	page number #
U.S.	United States

Definition of Terms

Table 2. Definition of Terms

Term	Definition
H1B visas	Foreign worker visas issued to IT/IS professionals such that they can legally work and live in the united states (McManes, 2003)
IT/IS Offshore Outsourcing	IT/IS Offshore outsourcing is defined as a commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client.
Logic in practice	Is the logic how research is actually carried out, it is relatively ambiguous, based on judgment calls and has a few sets of rules (Neuman, 2003c)
Offshored job positions	A U.S. firm's IT/IS job positions held by foreign workers living in a country other than the United States (United States Government Accountability Office, 2004)
Offshoring	See IT/IS Offshore Outsourcing
Offshore outsourcing provider	The firm that sells offshore outsourcing services to a U.S. firm having technology services, therefore providing foreign IT/IS workers living outside the U.S. (Yalaho, Nahar, Käkölä, & Wu, 2005)
Outsourcee nations, offshore nations	Countries where U.S. Offshore outsourced job positions are taken into for hiring nationals of those destination countries. These countries typically have lower labor costs compared to the U.S., for the same or similar job types (Yalaho, Nahar, Käkölä, & Wu, 2005)
Outsourcing Client	A U.S. IT/IS firm that hires foreign workers, or foreign companies who are non U.S. registered residents U.S. (Yalaho, Nahar, Käkölä, & Wu, 2005).
Outsourcing	Hiring workers from outside the company's regular employee workforce (United States Government Accountability Office, 2004)
Reconstructed logic	The logic of doing research, it is highly organized and systematic, it is reconstructed into logically consistent rules and terms: for example the rules of conducting a random sample; it is a step by step procedure (Neuman, 2003c)

Summary

U.S. universities are the main source of U.S. IT/IS workers whose job positions are being shipped offshore. Unemployment for U.S. IT/IS professionals rose to unprecedented levels by the end of 2004. It costs less to hire an outside offshore expert compared to developing one in-house. Computer science programs once viewed by students as a ticket to wealth are now seen as a path to unemployment (Foster, 2005). This view has reduced IT/IS student enrolment. This reduced enrolment trend for IT/IS programs has created concerns to IT/IS college administrators.

The circumstances and forces behind offshore outsourcing present a challenge to the U.S.'s historical lead in high-tech innovation, the software and hardware services. Some university administrators have responded to offshoring with a vision. They are responding to the undesirable offshore outsourcing influences like reduced student enrolment. Enrolled and prospective students in IT/IS programs need to build confidence that training for an IT/IS profession in college is a worthwhile undertaking. As IT/IS offshore outsourcing increases, educators can expect questions from students about IT/IS job availability at graduation. IT/IS administrators are faced with a situation of designing undergraduate courses that attract new students, while retaining enrolled students. Concerns are raised if a perception is held by future or prospecting IT/IS students that computer programming is being auctioned out offshore to the lowest bidder. Those students intending to pursue an IT/IS career may get threatened, or withdraw from IT/IS programs. The following chapter discusses literature on offshore outsourcing, and suggested economic theory explaining this phenomenon.

Chapter 2

Literature Review

Chapter two provides a history of offshore outsourcing. It discusses offshore outsourcing trends and issues found in the literature review. It substantiates the motivation behind offshore outsourcing by U.S. companies, it also looks at the advantages and disadvantages of the offshoring phenomenon. An overview on offshoring data is provided, and the job trends in IT/IS careers highlighted. The Offshore outsourcing consequences and influences on the U.S. IT/IS education system are discussed. The economic theory that can explain offshoring is discussed. This includes; the theory of absolute advantage, and the theory of comparative advantage.

Offshoring History

A Historical Perspective

Organizations chose the offshore outsourcing of IT/IS functions to achieve certain strategic, economic and technological advantages over their competitors (Kaiser & Hawk, 2004). Eastman Kodak's outsourcing decision in 1989 marked a turning point for the strategic importance of IT/IS outsourcing. Information systems outsourcing had its origins in the 1960's and 1970's. This was back when computers required large spaces, and were too expensive for most businesses to afford. Computers were a preserve of very

large corporations (Carr, 2004; Lee, Huynh, Chi-wai, & Pi, 2000). This form of outsourcing was mainly an onshore type of outsourcing that occurs within the same nation's boundaries. At the time of 1960's and 1970's, investment of computer hardware was capital intensive, and the programmers needed to make the technology operational were in limited supply. It therefore made economic sense to contract out (outsource) to specialized data processing service bureaus or system houses that could service more than one organization, and leverage on economies of scale (Carr, 2004; McFarlan, & Nolan, 1995).

Whereas hardware costs dominated the budget in the 1960's, software development was the highlight in the 1970's. Application packages and system software like database management systems came to market in the 1970s. The demand for the information system developers exceeded supply, which started the notion of contract programming, a form of outsourcing. Processing service bureaus had a diminished significance at the dawn of mini- and personal- computers in the 1980s. The rapid change in hardware and software in the 1990s, coupled with network management and communications meant that the outsourcing of IT/IS services like systems integration, application development and telecommunications management was a necessity. Information systems outsourcing became a normal way of conducting business, which managed to overcome user resistance (Loh & Venkatraman, 1992).

How well the IT/IS services are managed determine the future of a firm's success. It is therefore important that an organization can maximize control and flexibility of its IT/IS services and resources. This has led organizations to seek greater flexibility and control through offshore outsourcing provided by overseas external service providers. It

gives a leeway to corporations by having their IT/IS departments focus on core competencies, which bring value to an organization's objectives.

Offshore outsourcing providers tend to lack project management skills. They employ mostly new college graduates having low-level technical skills. They are therefore capable of low-level programming jobs and testing. High-level software skills of design and analysis are likely to remain a preserve in the United states. Offshore workers that are brought onshore for face-to-face activities are unlikely to go back in their native homelands, but instead find new jobs in the United States (Yalaho, Nahar, Käkölä, & Wu, 2005).

The Theory and Research Literature

In an era of offshore outsourcing, Hawthorne and Perry (2005) stated that: "Software engineering is changing in fundamental ways, so software engineering education must also change" (p. 643). The current software engineering curricula is inadequate to address the increasingly global software development paradigm shift. It does not satisfy needs of the mushrooming open source software modules, and/or the commercially available off the shelf software components (Hawthorne & Perry). The new software engineering development model is multi-faceted, and rendering development activities as a commodity, which is principally traded on price. The propensity towards this trend is partly caused by the application platform's reliability on core system components developed from third party-vendors. The combination of competencies that are therefore needed in software engineering simply go beyond excellent software development skills. The software market is highly competitive and largely driven by short-term market opportunities and financial results. These opportunities impact

software development projects with requirements shifting on short-notice, and the pressure to produce products at reduced or minimal cost. Software engineers are trained to design complete systems, but in addition to this, they also require greater expertise where by some of the tools are third party components. There are globally distributed teams working on distributed projects, and also operating across national boundaries.

Offshore outsourcing is perceived to reduce job positions in IT/IS in the U.S. However, the reduction of workers in IT/IS can happen for a number of other reasons for example; the structural changes of work and normal business cycles. Productivity increase in software development, automated network monitoring, and the deployment of self-healing intelligent networks. When these factors are explored, it means that fewer workers are needed to accomplish certain tasks. There has been a shift in the way software development is done, i.e. from individual programmers into a team development activity. This makes existing systems work in multiple environments. The construction of software modules instead of single or monolithic systems increases the efficiency of new programs and thereby increasing productivity. Modules provide quicker benefits than single (monolithic) systems. The later do not do so until the monolithic system is completed. Modules are smaller, flexible and hence reduce the complexity associated with monolithic software programs (Niederman, 2004).

Whereas offshore outsourcing may be an IT/IS job killer, there are still other open avenues that can act as a remedy to this problem. New product designs and services can increase opportunities for IT/IS workers. Automation generally reduces the IT/IS worker ratio to the number of computers, but the management of automation creates new work opportunities including support and maintenance. Electronic targets that an individual

carries in everyday life have grown; they include iphone, ipods, personal digital assistants, cell phones, navigation systems and more. The next 'killer app' will harness the power of these devices. For example, personal digital assistants and Wi-Fi technology may well lie in how innovators can integrate the technologies to better serve the end users. To the conquering of the technology frontier through innovation, there is no apparent end in sight. Another factor that will help in creating job opportunities is the rate at which ageing employees retire. The U.S. department of labor statistics gap analysis survey of 2003 revealed that the average age of IT/IS workers retiring from the profession was 45. The survey also found that more than 50% of the information technology workforce averaged 45 to 69 years (Niederman, 2004). If all these or even half that population retires in the next couple of years, this would create a great opportunity for job seekers in the IT/IS profession. The difficult question may be how many of those vacancies could end up being outsourced offshore?

Offshore outsourcing will continue to grow as experience and knowledge in how to successfully manage an outsourcing relationship either wholly or in partiality increase. Firms will be reluctant to ship jobs offshore if they hold significant concerns about the security of their systems and data. Security is as strong as the weakest link of an information technology or system. The several places of work activities for a firm, created by offshoring overseas, provide a safety net from the danger of having a single point of failure (a single location based technology services delivery point). However, it also presents multiple points of malicious attacks. The continued migration of jobs from the U.S. to India, China, Eastern Europe and Russia is expected to grow (McFarlan & Rockart, 2004). It is those jobs that can easily be replicated in developing countries like;

programming, information technology services provision, and help desk that face the immediate impact (Niederman, 2004). As for the IT/IS professional, they need to constantly upgrade their skills, or train in cutting edge technology solutions in order to retain jobs or develop skills that are offshore-proof. A. Hoffman (personal communication, 2004) has suggested that: "To avoid being sidelined by offshoring, IT professionals must be top-notch technologists and stellar communicators, adept at maneuvering in the world of business and willing to work with offshore personnel."

An Overview of the Offshore Outsourcing Process

Offshore outsourced software development has a number of boundaries: social – distance collaboration and communication, cultural – differing nationalities, historical – different work environments, temporal – different time zones, geographic – separate locations, technical – complex projects, political – non-intersecting interests between the outsourcing client and offshore vendor (Yalaho, et al., 2005).

The process of offshore outsourcing involves planning, control and continuous process improvement. These supporting functions help an outsourcing client effectively manage an outsourcing relationship (Mani, Barua, & Whinston, 2006). The outsourcing of software development brings into focus a number of issues namely; information system outsourcing, usage of international information technology and technology transfer. Yalaho et al. (2005) developed a conceptual framework of the offshore outsourcing process. In this process framework, they identified seven phases. The seven phases are: 1) Strategic analysis and decision, 2) International market research and promotion, 3) Selection of providers, 3) Contract negotiation, 5) Project implementation, 6) Managing the relationship, 7) Evaluation and contract termination.

The major activities in the seven phases include usage of IT/IS tools, stipulating preconditions and developing performance measures. The IT/IS tools can include any of the following: intranet, email, telephone, mobile communication, fax or multimedia communications. Preconditions and performance measures can provide input to the cascading phases of offshoring. Performance measures are used to specify expected outcomes of each phase.

Offshore outsourcing is knowledge intensive whereby knowledge is achieved through experience acquired over time learning and executing activities. This process is characterized by both success and failure. The needed skills to ensure success are in project management, and the design plus analysis of software development. These skills take time to develop. Creativity, communication and organizational understanding, plus consultation with end-users are important attributes of the learning process. The actual coding of software requires less skills, but is relatively labor intensive.

Offshoring Information

Trends in Offshore Countries – India

The competition for IT/IS jobs by offshore countries and the U.S. should not come as a surprise since the United States has trained the world's best and brightest for years. India is the most significant offshore player because of its large talent pool and many new IT/IS graduates produced in that country annually. If a high school student in India is asked who they admire most, it is Bill Gates. On the other hand, a high school student in the U.S. would probably say "Britney Spears". Therefore the Britney Spears of India is Bill Gates and here in the U.S., the Britney Spears is actually Britney Spears,

(Friedman, 2005). This attitude is partly what print and television media is promoting, and hence culminates in a reduced interest in IT/IS related disciplines for both high school graduates and college students.

The offshore outsourcing industry in India has grown to the fastest growing sector within less than half a decade. Exports and services in software grew by 20% to \$12.2 billion by 2004 (Aron, Clemons, & Reddi, 2005). India has a number of advantages that support the IT/IS offshoring business. It is an English speaking country, there is also a vast and growing labor force. Foreign direct investment has been steadily and immensely growing for over a decade. The high skilled labor presence and its availability at a fraction of the cost compared to the United States labor cost, makes it a compelling offshore attraction. An enabling business environment of economic reforms created by the successive Indian governments have been an added incentive to offshoring in India (Aron, Clemons, & Reddi).

A Synopsis of Offshore Outsourcing Data

The American Engineering Association suggests that there's no reliable data on job losses due to offshore outsourcing (Schneiderman, 2004). The Bureau of Labor Statistics has not developed enough data for the new set of surveys referred to as job openings and turnover, which is intended to help bridge the information gap. The perceptions and consequences on offshore outsourcing data are mixed due to information deficiency. In some cases however, it is acknowledged that a problem exists, but it requires more research studies. There is a positive view that company savings accruing from offshore activities is expected to provide money for new U.S. investments, which will in turn generate new IT/IS jobs (Schneiderman). There is another opposing view to

this notion, that is cost savings may still be invested in offshore countries, and therefore not help job creation within the U.S. New and innovative technologies like nanotechnology are also anticipated as the next "big thing" that will absorb the fallout from offshore outsourcing. However, this may not hold the promise in restoring the total jobs lost in the U.S. (Hira, 2003a).

Re-investing from offshore savings, may be true in part, but fails to acknowledge that other beneficiaries and conditions may not fully compensate for the lost jobs. For example, re-investments may still be done offshore; the resulting savings may also go to company executives and stockholders (Kilbane, 2004). It is unlikely newly created jobs in IT/IS or other service areas by-reinvesting the saved funds, will exceed or even equal in economic value to those lost through offshore outsourcing. A proper assessment of offshore outsourcing effects faces some hindrances, which include: downplaying by offshore agents and industry on actual figures of outsourced jobs, and mis-information suggesting it is not important.

An Institute of Electrical and Electronics Engineers (2004) survey on older unemployed engineers suggest that offshore outsourced job losses affects not only low level programming job positions, but even those IT/IS workers that have many years of experience. The survey was conducted on 5,329 IEEE members that reported being unemployed in the 2003-2004 membership years. With a response rate of 19% (988 returned surveys), 42% were involuntarily unemployed. When asked on why they lost their jobs, 62% cited business downturn, 15% had their jobs transferred offshore, 10% lost jobs due to a merger or acquisition, 7-8% had their work relocated within the U.S. or lost jobs because of efficiency improvements. When asked whether they wanted to stay in

their primary area of competence, 80% wanted to remain, and 20% wanted to move out. Thirty nine percent of the respondents wanted to return to school full or part-time. Thirty seven percent wanted to leave the profession entirely. When asked to describe their experience on job searches, two-thirds (66%) said it was very difficult to find a new job. Less than one-third (27%) would recommend their sons or daughters for a profession in engineering, and 41% would not recommend at all. When asked on the long term view on demand for engineers, 5% saw it as excellent, 24% saw it as poor, 38% saw it as fair, 33% saw the outlook as good (see Figure 4). When asked what the IEEE should do, the largest group asked that domestic engineers should be protected, and IEEE should take steps for congress to stop H1B visas (the hiring of foreign workers brought to the U.S.), and the outsourcing of jobs overseas.

The IEEE has memberships that include IT/IS Professionals and electrical / electronics / mechanical engineers, plus other scientists. The important and relevant finding in the above survey result highlights offshore outsourcing as being second in rank causing unemployment for the engineering professionals.

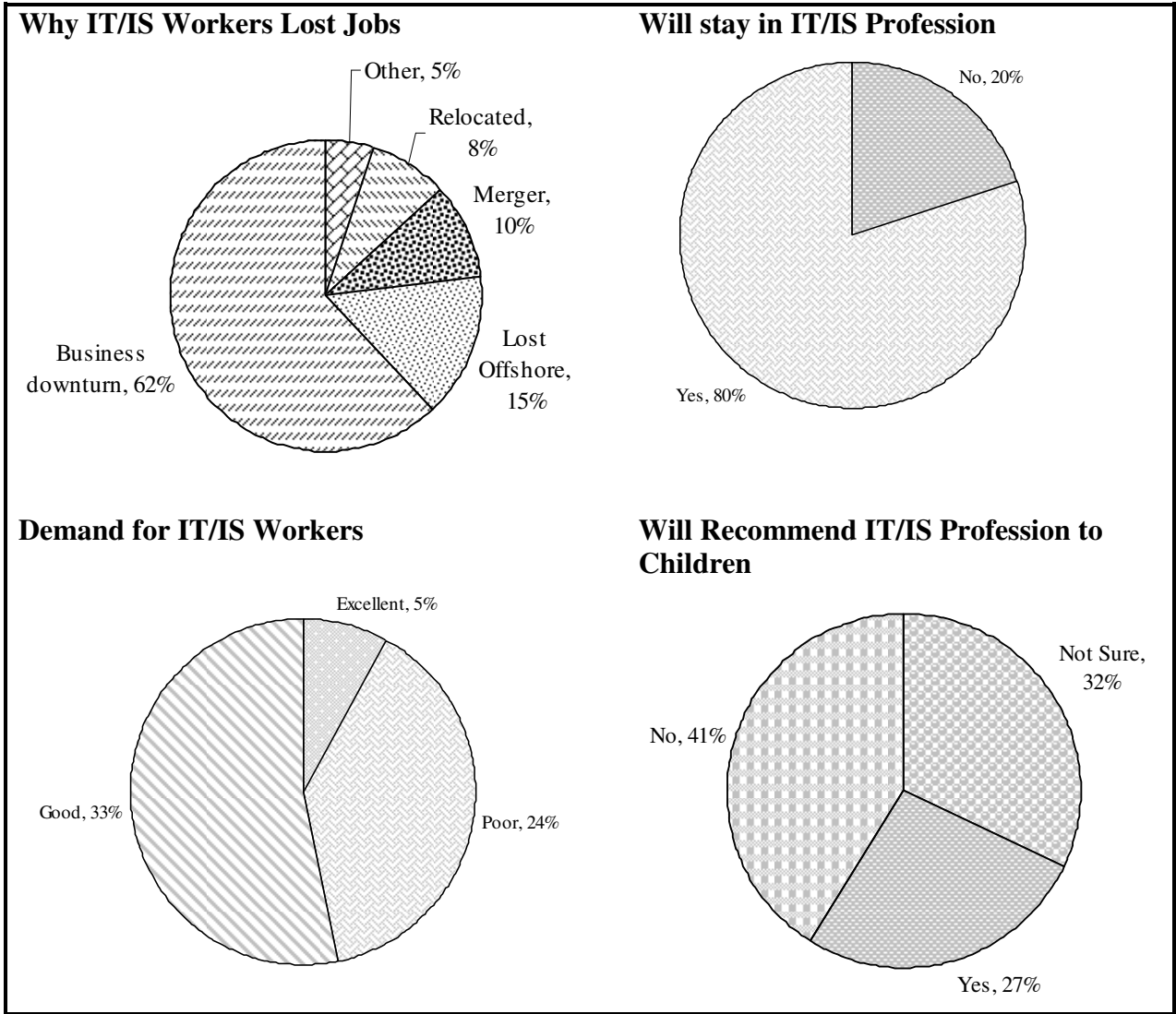


Figure 4. IEEE IT/IS Laid Off Worker Surveys (Institute of Electrical and Electronics Engineers, 2004).

The top ranking suggestion for a remedy to minimize unemployment was to lobby congress stop offshore outsourcing, and also stop the H1B visa program. It can be stated that the direct impact of IT/IS offshore outsourcing on individuals losing jobs, is greater than what media debators and talk show discussants perceive.

A Positive Outlook for IT/IS Jobs

Denning (2004) describes the myth about IT/IS; it socially categorizes all jobs within IT/IS as being associated with programmers. There are many job categories within IT/IS like network design, database administration, computer architecture, operating system engineering, graphics design, software architecture, systems analysis, network security, virtual reality design, supercomputing and grid computing support, etc. Denning continues to describe the great scientific and engineering principles of computing. The principles include design and mechanics of computation, automation, communication, recollection and coordination. The core practices in computer science are engineering of systems, programming, modeling, and innovating. An IT/IS professional requires competency in the practices of programming, systems design, modeling and innovating. Denning recommends that the IT/IS curriculum should be reorganized to teach all four practices in a coherent way (Huen, Ferguson, Henderson, & Kussmaul, 2005).

If low end programming jobs are the most likely target for offshore outsourcing, the list of other IT/IS disciplines like virtual reality, data mining, and computational grids, etc., provide other opportunities for jobs that require the relevant training and practice. It is important that a continuous upgrade of an IT/IS professional's skills are maintained to ensure employability in an IT/IS global marketplace competition.

Advantages and Disadvantages of Offshore Outsourcing

Advantages of Offshore Outsourcing

The U.S. companies seeking to implement, or undertaking offshore outsourcing activities, have a strong incentive based on the lowering of costs for developing, building

and maintaining information technology products and services for their customers. This therefore raises a firm's bottom line, increasing productivity, profitability and the stockholders value. Offshoring creates the advantage of loosening the hold on developers for other products and services developed within an organization. This loosening creates room to focus on core competencies or strategic projects of the U.S. IT/IS personnel (at least for those whose jobs are not outsourced). Core competencies highlight those IT/IS jobs less prone to cheap overseas labor. One of these competencies could be to maintain a hold on planning, plus the detailed product evaluation and design for the U.S. "local" markets (Marcus, 2004). The freeing up of local personnel can create room for another role in dealing with offshore service providers, through training and mentoring. This is a key role because of the geographically multiple location projects and complex cultural issues involved. Offshoring can also be used to replace experienced but aging workers at a fraction of the cost.

Offshore outsourcing creates access to specialized skills and/or processes; for example the Capability Maturity Model Implementation, for improving the software development process (Rottman & Lacity, 2004). Offshoring enables "round-the-clock" software development; offshore teams can work while their U.S. counterparts are asleep (Ferguson, Kussmaul, & McCracken, 2004). Round the clock development makes the sharing of knowledge between the offshore providers plus consumers of the offshore products and services critical to success.

Supporting conditions for offshore outsourcing include:

- Improved networks and information technology
- Reduced human resource costs

- As the offshore outsourcing processes mature, offshoring will get more efficient and attractive (Cullen, Seddon, & Willcocks, 2005; Rottman & Lacity, 2004)

As a value judgment, offshore outsourcing is re-distributing wealth from the haves to the have-nots. It also helps companies to locate near their customers, thus providing the best service in a local time zone and language. Offshore outsourcing taps into the top quality talent in the countries of service relocation (Fraser, Anderson, Crocker, Gabriel, Fowler, & Lopez, 2004; McFarlan & Rockart, 2004).

Disadvantages of Offshore Outsourcing

Offshore Outsourcing carries certain risks; for example loss of morale for existing staff and a perceived loss of internal project control. Offshore outsourcing creates cultural, time and distance variations, which can generate a negative influence on the progress of work. Trusting partnerships are important in making offshore outsourcing decisions. To have these partnerships requires commitment, the understanding of each other's businesses, a shared view of trust, compatibility, mutual benefits and the effort to mitigate the inherent offshore process risks (Benamati & Rajkumar, 2002).

There is a pessimistic view of collapsing jobs and markets within the U.S., which is created by the offshore outsourcing phenomenon. Domestic unemployment, underemployment, lack of reliability, insecurity and violation of privacy are significant issues that shipping out jobs through offshore outsourcing creates for the U.S. economy. Political instability in outsourcee nations, the lack of adequate protection for intellectual property rights are other risks that come with offshore outsourcing. The inexpensive communication and data infrastructures have accelerated this process and hence deepened

the concerns raised by these factors (Weinstein, 2004). Whereas increased productivity and improved corporate bottom lines are desirable, the loss of domestic employee job positions is devastating to those IT/IS workers directly affected in the process. These individuals may be left without alternative jobs of similar or better compensation. The IEEE position paper on offshoring states that:

The offshoring of high-tech jobs from the U.S. to lower-cost overseas locations is currently contributing to unprecedented levels of unemployment among American electrical, electronics and computer engineers. Offshoring also poses a very serious, long-term challenge to the nation's leadership in technology and innovation, its economic prosperity, and its military and homeland security. (Hira, 2003a, p. 5)

Poor communication is cited as a major cause for offshore project failures.

Language neutral or culturally neutral requirement specifications are needed for a successful offshore engagement. Factors that hinder offshore outsourcing include:

- Cultural differences
- Logistics of remote resource management
- Slow change management processes
- Need for client access to essential activities like testing and integration

Current IT/IS Situation in Relation to Offshore Outsourcing

Foster (2005) quoting a commerce department analyst writes: “But while high-end technology jobs in the United States may be abundant, the outsourcing of ‘low-end, routinized’ information-technology jobs, including some low-level programming positions, is on the rise” (p. 2). The Internet crash of 2001 led to the loss of several jobs in IT/IS. The ensuing economic recovery process has not restored this job fallout, as companies chose to outsource IT/IS jobs, hence taking advantage of lower labor costs offshore (Denning, 2004). Information technology plays a double role in offshore

outsourcing; both as an enabler and also as a goal (Mendonca, 2004). News media through print, television and the web indicate that a significant number of high-technology jobs have gone offshore. Marcus (2004) suggests that: "The orientation to outsourcing business processes seems to continue unabated, even though some companies have expressed concerns about some problems of quality and have actually taken back call centers to the U.S." (p. 14).

A Forrester research analysis estimates that 3.3 million white-collar jobs will be shifted overseas by 2015 (McManes, 2003). Reduced labor costs are the principal reason. A World Bank survey indicates a U.S. Engineer with a \$70,000 salary has the same purchasing power as a Hungarian Engineer earning \$25,690, or Indian Engineer with a salary of \$13,580 (Hira, 2003b). It is sustained innovation that can maintain the United States in the competition of who can pay their workers the least. Notwithstanding the innovation, global competition accelerates job destruction, displacing communities and individuals. Schneiderman (2004) gives this telling outlook on offshore outsourcing:

Decisions to ship high-tech jobs offshore have become more the norm in executive boardrooms across the U.S. One out of every four high-technology jobs in developed nations today will be outsourced to emerging markets such as India by 2010. As several analysts and economists have pointed out, offshoring is no longer a trend. Rather, it's part of a vast change in industry productivity and how the industry competes globally. (p. 1)

An estimated four out of ten companies have moved part of their IT/IS department functions offshore, and this trend is expected to rise. The decision-making processes involved in offshoring are based on complex issues and options faced by IT/IS managers of companies involved in the offshore activities (Weinstein, 2004). There are factors in addition to cost savings, which if lacking would make it impossible for

companies to outsource IT/IS jobs. Some of these factors include tax incentives, government policies, reliable and sufficient network bandwidth (high-speed telecommunications), facilitating global communications and access to skilled manpower (Gopal, Mukhopadhyay, & Krishnan, 2002).

Whereas offshoring is not a new trend in other industries like manufacturing, steel, automotive, textile, and electronics, its entry in the IT/IS discipline is. Just like those industries that have undergone offshoring, the economic drive for this trend is basically the same: the financial benefits generated by lower costs of conducting business in other countries.

The kind of jobs being outsourced include: mainframe data center support, software upgrade / maintenance, reengineering, consulting, training and application development. Other areas considered for outsourcing are: networks, end user support, desktop systems, client/server development and sometimes the establishment of information technology departments offshore. IT/IS skills have become a global commodity. The least productive software professionals are slated to vanish, which is about one-fifth of the U.S. IT/IS workforce. Failure to update worker skills and increase efficiency will encourage this trend. There is an increasing brain trust offshore that rivals that of the United States. This is making companies move research and development activities offshore (Ferguson, 2004).

Competition is a natural attribute in a free market economy. Businesses and individuals will buy goods and services from a supplier that provides the best value to the purchaser. The attractiveness of outsourcing is based on the cost effectiveness in buying IT/IS services from third-party vendors (Fulbright & Routh, 2004; Matloff, 2004).

Offshoring Implications

Job Skills Required and Enrolment of IT/IS Students

The consequences of offshore outsourcing on IT/IS students were looked at in the context of their employable skills at graduation from college. IT/IS Student enrolment has dropped over the period of 2002-2004 by as much as 30%, with drop out rates of enrolled students ranging from 35% to 50% (Denning, 2004). This reduction suggests that prospective students were being discouraged from studying IT/IS college courses. Offshore outsourcing might discourage even the best and brightest students interested in an IT/IS career. These students are the drivers behind innovation and generation of new products.

With this offshore challenge, some of the skills needed for students graduating as IT/IS professionals in the U.S. include project management with the ability to manage remote teams, and communication skills that can handle cultural differences (Reich & Nelson, 2003). To illustrate the type of skill sets required for the future IT/IS graduate, Fulbright and Routh (2004) constructed a vendible model (See Figure 5).

A significant question company executives use in deciding to outsource offshore or not is; how cost effective is it to hire external vendors for a particular IT/IS service or product? It is a reasonable expectation that not all services and products in IT/IS can be offshored. Fulbright and Routh (2004) postulated the vendible model identifying a boundary called the vendible line. Above this imaginary vendible line are jobs in IT/IS that cannot be outsourced offshore, and below it are those ones that can be offshored.

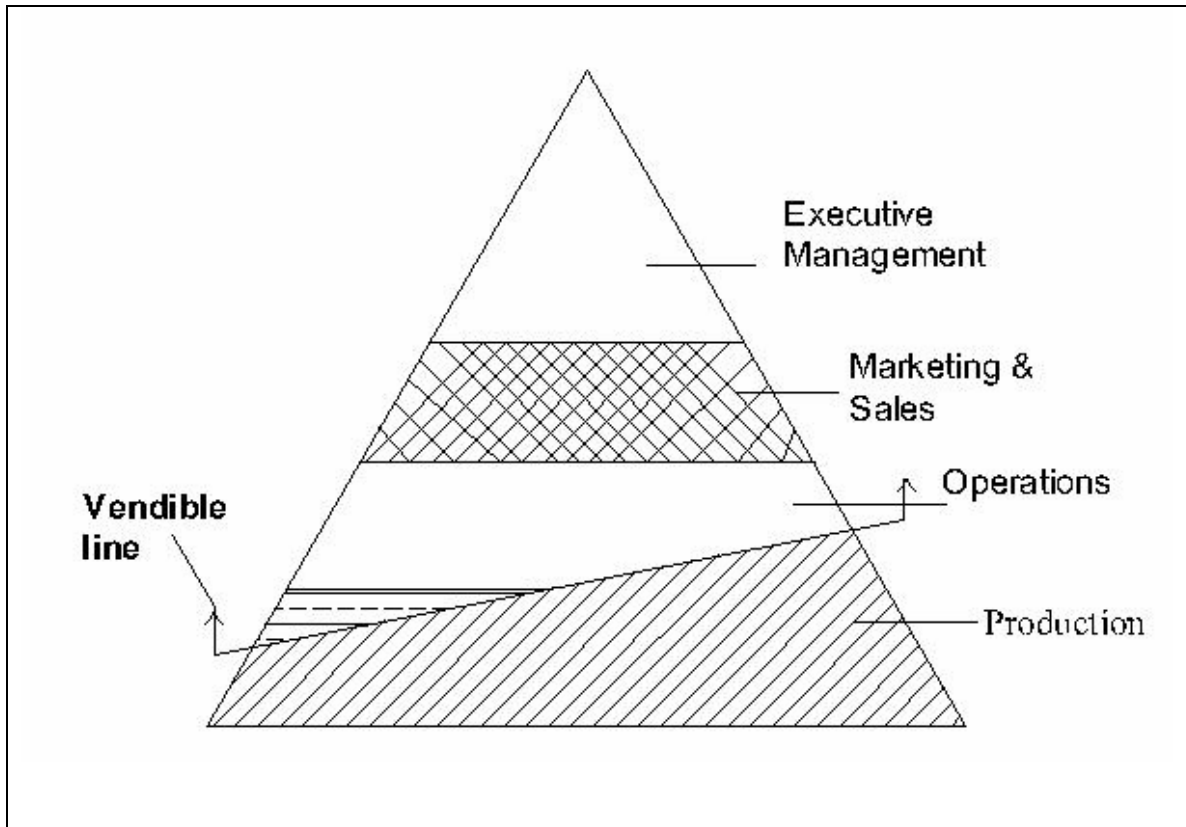


Figure 5. The Vendible Model

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Source: ACM Proceedings of the 5th conference on Information technology education.

The job positions that are offshore proof possess certain characteristics. It is these characteristics that can be used in IT/IS training to produce student graduates that are offshore proof in the IT/IS job market. The U.S. being a world leader in IT/IS innovation, jobs running in the realm of new technologies may not be outsourced offshore. New IT technologies may be an area students need to seek career training. This training can be offered if courses in new technologies are created.

An enterprise is hierarchically represented as shown in Figure 5 whereby the highest paying job positions lie near the top of the pyramid. Lower paying jobs are the first ones to get outsourced offshore. There exists an imaginary vendible line, which

shifts upwards on the pyramid as more jobs get outsourced offshore. This line separates non-offshored jobs from offshored job positions. The vendible dynamic of Fulbright and Routh (2004) is permeating the IT/IS careers, whereby software development jobs are falling below the vendible line through offshore outsourcing.

Above the vendible line is the strategic regime and below it is the commodity regime. If the vendible line was to go all the way to the top, the U.S. local IT/IS departments in an enterprise would cease to exist. Its employees would practically be virtual with no IT/IS human faces to be seen within the U.S. national borders. Fulbright and Routh (2004) suggest that the holy grail would be a virtual company with a few executives in charge of a financially significant company that is totally outsourced offshore. The vendible line of such a company would be very close to the peak.

Looking at the perspective of this vendible model, it raises a fundamental question: What are the desirable job characteristics and skills for graduating student positions in IT/IS that will stay above the vendible line? Here below is a list of some important characteristics:

- IT/IS positions harnessing critical business knowledge. IT/IS personnel and student graduates need to take on the role of business consultants.
- Ability to perform in more than one position, skills flexibility is a core characteristic here, students should be trained in multiple IT/IS skills.
- An IT/IS professional or student that is a quick learner and knows how to apply technology in a variety of situations.
- Excellence in project management skills, and systems integration, students need to take project management courses.

- Assume leadership in identifying and quantifying opportunities for IT/IS to create business value (Fulbright & Routh, 2004; Reich & Nelson, 2003).

The required job skills for IT/IS professionals and student graduates that businesses will be willing to pay for may not be characterized by the production of generic software. Project management, security, the coordination and control of remote project teams and ability to deal with cultural differences may be the desirable features of a seasoned IT/IS employee. IT/IS students need to learn work skills that can assist them be effective in a culturally diverse work environment. Having oral and written communication skills coupled with the ability to develop efficient technical solutions in a business environment will be required for future and current IT/IS employees that will stay above the vendible line (Ferguson, et al., 2004).

The view to outsourcing at a particular firm was that changeable technical skills, and those lacking a need for creativity are prime candidates for offshore outsourcing (Reich & Nelson, 2003). The skills and expertise of IT/IS personnel and students need to go through a continuous evolutionary process in order to be able to meet new and future challenges in the organization. IT/IS people need to develop strong teamwork and excellent collaboration skills transcending geographical and cultural boundaries. Skills to be able to lead, negotiate, persuade and influence others in a work environment are both necessary and essential. The IT/IS student training should consider these important factors while assimilating them into IT/IS courses so as to address the new offshore outsourcing challenges.

Offshore Outsourcing Consequences on IT/IS Departments

As computer science and information systems departments train to address a rapidly changing IT/IS global workplace, research in understanding offshore outsourcing implications is necessary. The drop in computer science enrolment for incoming college freshmen has been substantial defying the imagination of a cyclical trend (Fulbright & Routh, 2004). The challenge faced by educators and IT/IS departments in colleges, is the decision on how to offer relevant training to IT/IS students in response to offshore outsourcing. It might lead to an evolution of new training that creates a new generation of IT/IS graduates. Offshore outsourcing is apparently mandating for a new kind of IT/IS college graduate. A graduate that is characterized to have multi-disciplinary skills with some of the following requirements: an understanding of computer technology, communication abilities, the willingness to learn new job responsibilities and also having diverse work skills (Fulbright & Routh). This new kind of graduate may not really fit into the current knowledge description and expected competencies of a traditional "IT/IS graduate" (Mendonca, 2004). U.S. Future IT/IS graduates might become coordinators onshore for their company linking project work with offshore personnel overseas.

The skills IT/IS students need may include interpersonal skills, relationship management, project management and actual industry experience. As IT/IS jobs move offshore, IT/IS graduates need the ability to integrate knowledge in accounting, business law, economic and management principals. Computer science and information systems departments need to adjust training to better prepare students for a globally competitive IT/IS workplace, given the current and dynamic offshore outsourcing trends.

Information systems and computer science has increased the productivity of many disciplines such as: office automation, production processing, inventory management, etc. Ferguson et al. (2004) raises some important questions: Can research make software development more productive so as to maintain jobs in the U.S.? What are the necessary changes needed for IT/IS training to better prepare graduates getting into the new work environment? Is academia adaptable, and will it be fast enough in adjusting to new realities of offshore outsourcing? In the new role of IT/IS service personnel, Reich and Nelson (2003) state that: "As IT organizations rise to the challenge of business leadership, cost containment, and flawless execution, educators must ensure that students in IT programs are equipped to participate in the workplace of tomorrow" (p. 42).

The training provided to IT/IS students is expected to be responsive to issues on current employment and job trends. When job issues (like offshore outsourcing) are considered, it helps provide confidence instead of uncertainty to graduating or prospective students in IT/IS. The confidence here is that a student will have a job available, at the appropriate time, and when needed. Ho (2004) stated that: "The phenomenon of offshore outsourcing of information technology services demands both curricular and marketing responses from providers of information technology education" (p. 1). He continues to say that a serious re-examination of contemporary education in information technology is required given the apparent decline in IT/IS student enrolment in colleges.

A researcher conducted a snapshot survey on undergraduate enrolment changes over the past 5-years posting results on the ISWorld email list. The results of the survey

on MIS undergraduate enrolment change over the period 2000 to 2005 is depicted in Figure 6. The percentages show the drop in student enrolment.

Figure 6 data was collected through a survey sent on ISWorld. Although the method used was not scientific, it shows a big drop in enrolment ranging from 80% to 20% from the year 2000 levels (having an overall average drop of about 50%). The mid-west range, which had an average drop of 20% is based on the enrolment from 2001. With student enrolment trends plummeting, it is incumbent upon the college IT/IS administrators to try and understand the dynamics behind this rapid decline in student numbers. This trend raises a concern on why student enrolments have undergone an apparent large drop in numbers all throughout the United States. This is a challenge IT/IS administrators are faced with, which has to be addressed with careful considerations.

Certain universities and colleges have partnered with industry and the private sector to ensure that college students are trained in the right kind of marketable skills. Some of these universities include Ohio State Fisher College of Business, UCLA Anderson School of Management, Steven Institute of Technology, Babson College, University of South Carolina Upstate (Fulbright & Routh, 2004; Hoffman, 2003). Some of the initiatives being undertaken to provide the marketable skills include: encouraging internships and co-op programs for students, participation by CIOs in advisory councils for feedback on curriculum and job market demands (Sandvig, Ross, & Tyran, 2005). New programs are being devised for vertical markets; for example Information Technology in pharmaceuticals and financial services.

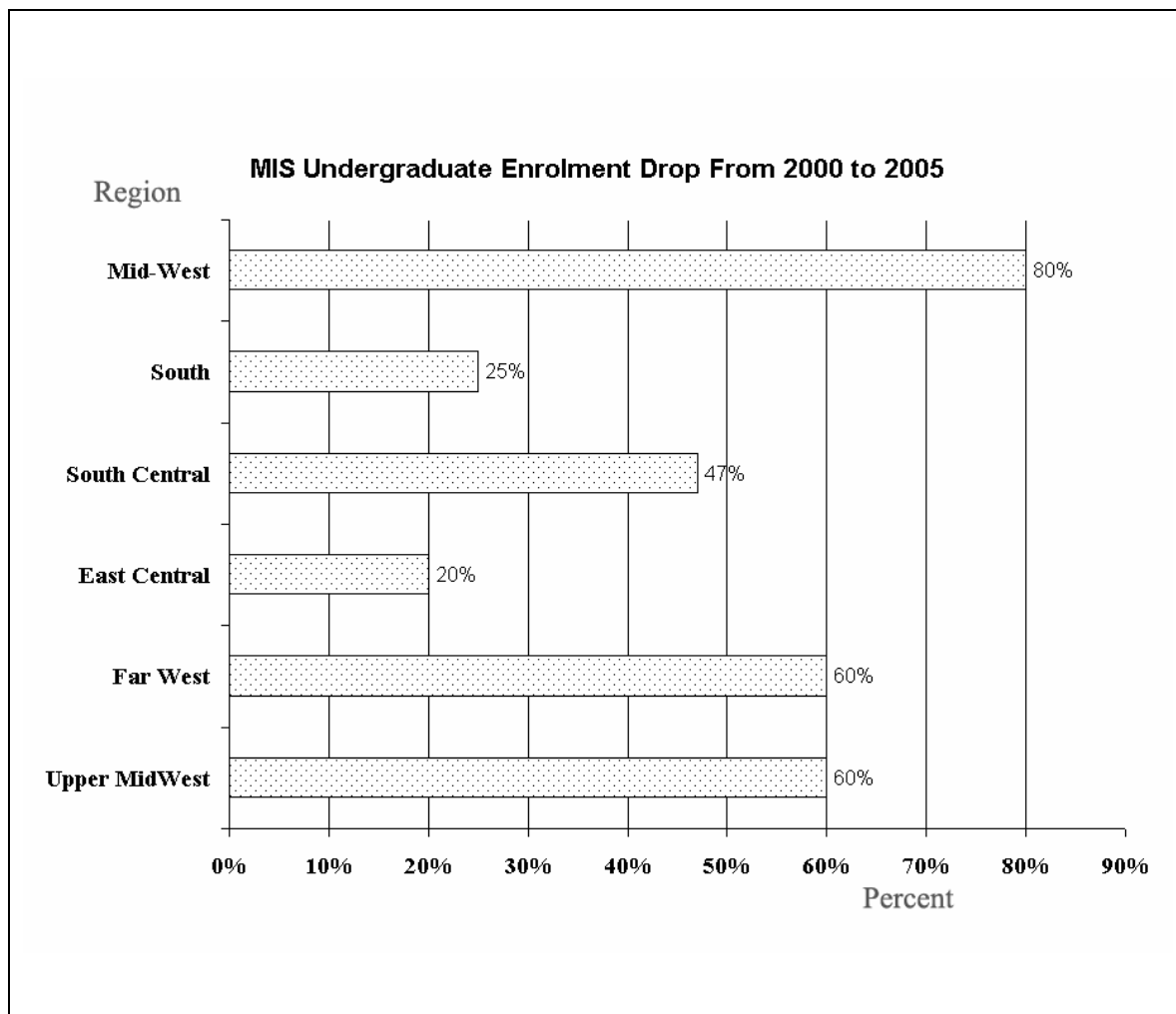


Figure 6. U.S. MIS Undergraduate Enrolment Change

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The broadening of business acumen for graduating students in IT/IS requires a concerted effort of academia, industry, college education policy makers and IT/IS course developers. To a recruiter, a perfect GPA is not the only sale; experience acquired through an internship makes a potential job candidate graduating from college a better one, even with a lower GPA score. Hoffman (2003) quotes MIT that invites corporate sponsors who present case studies and projects for students to work on and solve during the semester. This has the objective of making students understand issues like; how to work in a global IT/IS environment, or how to manage a business relationship with an

outsourcing vendor. Stevens Institute Hoboken introduced courses addressing some of these issues in class. It is probable that such education training initiatives practiced in these colleges and universities, will form the needed link in job searches. It potentially bridges the gap of making college IT/IS graduates get a career while staying above the vendible line.

The CIO's Perspective for New Recruits

A research was conducted to find out if qualifications of entry level hires had changed for chief recruiters of Chief Information Officers (CIOs) at ComputerWorld's top 100 information technology places to work (Ferguson, 2005). Job titles of software engineer, programmer and application developer were used in the survey. The survey focused on finding changes in required work skills like programming, internships, data structures, software development methodologies, etc., for the period lasting 3-years.

Technical areas such as data structures, programming fundamentals, algorithms and development methodologies were rated to be of high importance, but had no perceived increase in level of importance over the past three years. Soft skills of communication, project management and teamwork scored an increase in importance. Programming fundamentals had a perceived decrease in importance although not statistically significant. With background areas of needed skills having greater importance, the focus for educators is how to integrate new skills of business knowledge, oral communication, teamwork, and project management in existing and crowded IT/IS course programs. The survey revealed that real-world experiences through internships and volunteer work were important for new potential recruits to information technology companies.

A ComputerWorld survey with information technology professionals and CIOs suggested that colleges and universities are not preparing graduates for today's IT/IS jobs (Hoffman, 2003). The CIO hiring practices for IT/IS jobs has become more selective, with hands on experience counting as a strong criteria. One of the questions in the survey was: Are colleges and universities adequately preparing students for the information technology jobs of the next few years? With 226 respondents 15% said yes, 75% said no and 10% had no opinion. The second question was: Are colleges and universities adequately preparing students for the information technology jobs of today? With 227 respondents, 19% said yes, 74% said no, and 7% did not know.

The above survey result shows a significant (by 74%) disparity in the perception of CIOs on the relevance of training offered at colleges and universities. This creates the impression that since the relevant skills are not available locally in the U.S., the rationale behind offshore outsourcing in search of better skills is justifiable. It is also known that the U.S. has for many decades trained a great number of foreign students in the IT/IS disciplines. If these same students constitute a significant proportion of the offshore outsourced hires, then lower labor costs offshore might be the stronger cause for the offshore trends. A vice president (Hoffman, 2003) of a global information technology consultancy firm made this assertion:

We don't hire people into our company anymore straight out of college. There aren't as many of those types of development projects around today, and those jobs can be filled easier with people who already have business experience, he added. I don't need a person out of college to do that. It's a whole new ballgame. (p. 1)

The above statement suggests that development projects for new college graduates were not around in his firm, and may have been moved elsewhere. In addition, this raises a relevant question as to what percentage of CIO's apply a similar policy?

Offshore Outsourcing, the U.S. Economic Influence

Chakraborty and Remington (2004) suggest four major factors why companies outsource: (1) focus on core competency; (2) economic factors; (3) technological factors; and (4) regulatory factors. Core competence implies that a firm should concentrate on those areas it has superiority or special talent and outsource the rest to providers with the required talent and knowledge.

Economically, outsourcing reduces cost of production, opens up new local markets, provides an expanded time zone for work 24X7, and is a solution to failures on internal development projects. Technology factors include; increased data transmission rates at reasonable costs, advanced telecommunications, adoption of universal protocols and computing standards. Regulatory factors include: industry deregulation in developing countries for service sectors of telecommunications, financial services and transportation, which have stimulated foreign trade and offshore outsourcing in particular.

Historical evidence provides that offshore outsourcing in manufacturing killed 2-million blue color jobs in the U.S. but created 43-million white color jobs in other service areas like education, health, trade and transport, leisure, etc. Manufacturing output went up and labor productivity increased by 3.5% annually (Baily & Farrell, 2004). The digital revolution and affordable telecommunications has facilitated having jobs executed offshore at lower labor costs. The U. S. Government Accountability Office (2004)

estimates that every dollar spent in India, gains \$1.12 to \$1.14 in the U.S., and India captures 0.33 cents as labor to its workers. This is not “a zero-sum” game but offshoring provides mutual economic benefits to the participating countries (Baily & Farrell).

Baily and Farrell (2004) suggest that it is a myth to characterize offshore outsourcing as bad for the U.S. economy. It is rather a question of the type of service jobs that will be impacted by the international competition. What are the most likely influences on service sector jobs on U.S. output, employment and standard of living? The long-term effects of offshoring should not permanently affect the income and employment of the U.S. economy, if displaced workers are absorbed back into the expanding economy through training and assistance.

Offshore outsourcing has become established as a way of conducting software business. A number of software products are being produced by technology companies from offshore nations. This is a viable alternative to in-house development due to lowered costs, and the inability of retaining or hiring experienced programmers onshore. The other factors encouraging companies to outsource offshore include the ability to have a shorter time to deliver systems from project initiation to system installation (Yalaho, et al., 2005).

The most common denominator that compels firms to outsource IT/IS jobs offshore is cost savings, or paying less with overseas labor for the same service that cost more when hiring a local U.S. IT/IS worker. If this advantage holds true to any firm, then the corporate bottom line is raised, a firm makes more profits, and the return on investment is higher. A higher profit making organization is presumed to pay more tax dollars to government, and also may have more funds available for new investments.

These are positive effects of the offshore outsourcing engagement. On the other hand however, when jobs are displaced from the U.S. to offshore countries, existing job positions are lost by U.S. workers. This lost income, if not replaced by equally paying jobs at the very minimum, it means there is a net loss of taxes paid to Government. It also translates into lower purchasing power, so services and goods that workers could afford are not purchased, the economy suffers overall because less goods are bought or sold. There is a complex relationship or cascading effects that come in as a result of offshore outsourced job losses. The net effect can only be good for the U.S. economy if people loosing U.S. job positions to offshore countries get replacement jobs, which on average pay at least the same amount of money in salaries. Re-investment by benefiting firms is not guaranteed to take place in the U.S., and hence the corporate advantage of an increased bottom line may not necessarily translate into an economic benefit to the overall U.S. economy. The long term implications on security and competitiveness of the U.S. in the global market caused by offshore outsourcing are unknown (Power & Trope, 2005). There are advocates and detractors to the process of offshore outsourcing. Trade and Industry associations like; the American Engineering Association (AeA), Electronic Industries Alliance (EIA), and Information Technology Association of America (ITAA), advocate for offshore outsourcing. The IEEE-USA, with membership of U.S. engineers, is lobbying congress for control measures on offshore outsourcing to protect its constituents. Schneiderman (2004) suggests that in a survey of 104 Global Chief Information Officers (CIO), as many as 20% indicated that a lack of in-house talent to handle innovative development projects was the reason for shifting them offshore.

Carr (2004) suggests that the power and presence of information technology is being transformed from being a strategic resource into a commodity input, whose cost must be paid by all but provides distinction to none. Carr adds that:

Certainly there will always be a need for the creative genius in software development, but in the future it appears likely that most corporate software will be a commodity good churned out by anonymous factory workers spread across the globe. (p. 53)

Table 3 lists factors driving companies to outsource offshore. If IT/IS is becoming commodity-based in some areas, the theory of comparative advantage and theory of absolute advantage may be used to explain offshore outsourcing in IT/IS.

Table 3. Factors for Offshore Outsourcing

Factors	
1	Lower labor costs
2	Search for rare technical skills
3	Improved time taken between project initiation to deployment
4	Shorter time to market
5	Growing of software development capacity
6	Lowered risk for cost overruns and late projects
7	Flexibility
8	Gain Competitive advantage
9	Improved customer proximity
10	Time zone advantage adding to effective hours of work in a day
11	Improved and affordable technology infrastructure
12	Improved International trade laws and regulations
13	Increased and attractive incentives by offshore countries
14	Improved offshore outsourcing management of client/vendor offshore relationships

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Theory of Absolute Advantage

Suppose an offshore outsourcing country x (a client like the U.S.) is more productive in rolling out a software product or service m, then another country y (or outsourcee nation like India) is more productive in providing a software product or service n. Both countries mutually benefit in trading in products m and n as long as country x produces m and y produces n. The mutual benefit implies that the total m + n produced by countries x and y is maximized. Therefore the trading in services and products in IT/IS between the offshore outsourcing client and outsourcee nation needs to continue as all participants in the trade stand to gain from their actions (Suranovic, 2003).

Theory of Comparative Advantage

Following the arguments used in the previous section, where a country x (an offshore outsourcing client like the U.S.) and country y (the outsourcee country like China) conduct business producing software services and products m and n respectively. The theory of comparative advantage suggests that unlike in absolute advantage, country y (the outsourcee nation) is better at producing both software services and products, or m and n. It then seems that there is no economic benefit for the client country x, to trade with country y on the two m and n products. For an economic benefit to exist between x and y, specialization in separate goods and services in IT/IS for the two countries would generate a comparative advantage in production for both countries. This requires a need to identify a country's comparative advantage by comparing production costs across the two countries. This approach still assumes that some services in IT/IS are synonymous to commodity-based goods. The comparison of production costs across the countries would

not include monetary and resource costs, but opportunity costs of producing IT/IS goods and services across countries x and y .

It may seem an odd notion to consider IT as a manufacturing-based industry. But when one realizes that, for example, every line of code has to be produced by a developer and that there is little difference between crafting a computer program and stitching together a shirt, one sees the truth. (Fulbright, Routh 2004, p. 188)

The U.S. would have a comparative advantage for a software product r (spyware blocking), if the opportunity cost of producing the same product in an outsourcee country, China is higher. The opportunity cost of producing r is defined as how much of another product s (i.e. firmware development for wireless devices), must be given up to produce a single unit of product r . The U.S. would therefore have a comparative advantage on r if it must give up less s to produce a unit of r (Suranovic, 2003). There is a free trade offshoring benefit, which can be identified according to the law of the theory of comparative advantage. The benefit comes from; ‘the gains of the winners from trade must exceed the losses of the losers in the long run.’ (Chakraborty & Remington, 2004).

The Known and Unknown of Offshore Outsourcing

Offshore outsourcing possesses certain risks, like security, copyright and intellectual property protection, backdoor malicious code, cultural differences and political instability in offshore countries. These risks prompt some companies to embrace some mitigation measures like opening up subsidiaries instead of contracting out to a separate offshore vendor. It is estimated that 70% of outsourcing contracts are rescinded or re-negotiated (Ferguson, 2004; Mani, Barua, & Whinston, 2006). Managing an offshore engagement can wipe out the projected labor cost savings (Cullen, Seddon, &

Willcocks, 2005). The role of programming may be shifting towards project managers and business analysts. The decrease of jobs in IT/IS for support, maintenance, operations and implementation appear inevitable, but actual statistics on the overall trends are not readily available. There is a cloud of secrecy around companies that are planning or have started offshore outsourcing operations, given the media and political stigma that surrounds the offshore outsourcing phenomenon. Firms planning to outsource offshore technically keep this information off limits to public scrutiny and debate; this is the equivalent of “classified company information” (Khan, Currie, Weerakkody, & Desai, 2003).

There is all the above unknown factors surrounding the benefits and risks of offshore outsourcing including security risks, privacy issues, and the projected actual cost savings, which may not be significantly supported with data. However, what the literature research suggests, is the picture of a shrinking IT/IS workforce in the United States that is approximately depicted in Figure 7 and Figure 8.

Figure 7 and Figure 8 depict a before and after situation of reduced local U.S. IT/IS workers (citizens, permanent residents and H1B visa holders), as IT/IS offshore outsourcing intensified to be of concern. Both figures show increasing proportions of foreign offshore workers compared to U.S. local workers. The literature suggests that the total IT/IS employee number (U.S. citizens or permanent residents) is shrinking while numbers of offshore outsourced job positions is rising. There are H1B visa employees in the U.S., but these numbers are maintained at the congressional quota levels. It is also reflected in the research that whereas offshore workers experience increasing numbers,

the rate of unemployment of U.S. IT/IS workers is unusually high, and at unprecedented levels (Hira, 2003b).

It is generally accepted that the movement of IT/IS jobs offshore is going on the increase. The ongoing process in offshore outsourcing is an indicator for a maturing technology, whereby software is fast becoming commoditized and businesses are expanding globally (Carr, 2004). To maintain the lead in innovation within the U.S., colleges offering IT/IS education need to conduct the relevant research to better prepare student graduates in IT/IS for the global workplace.

It is difficult to fully assess the long term implications of offshore outsourcing on IT/IS future graduates, companies and the U.S. economy in general. The current economic climate has generated increased outsourcing activity, and a consideration of the phenomenon at all levels; academic, economic, political, or otherwise is imperative. In this study the following assumptions were made:

- IT/IS Offshore outsourcing was a 'known' issue by universities across the United States. This includes faculty, students and administration.
- IT/IS offshore outsourcing was a problem that generated certain consequences and stimulated certain changes in IT/IS related college programs.
- There was limited data identifying the consequences of, and to what extent IT/IS offshore outsourcing has had on IT/IS programs in U.S. universities.
- It was assumed there are different approaches universities are using to respond to the IT/IS offshore outsourcing phenomena.

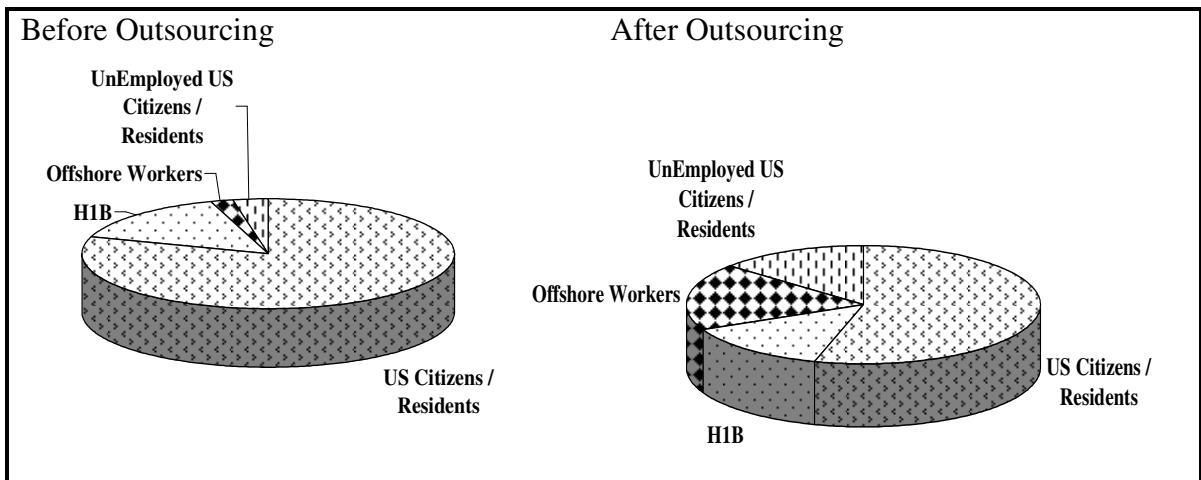


Figure 7. Perceived Global Job Sharing for IT/IS Workers

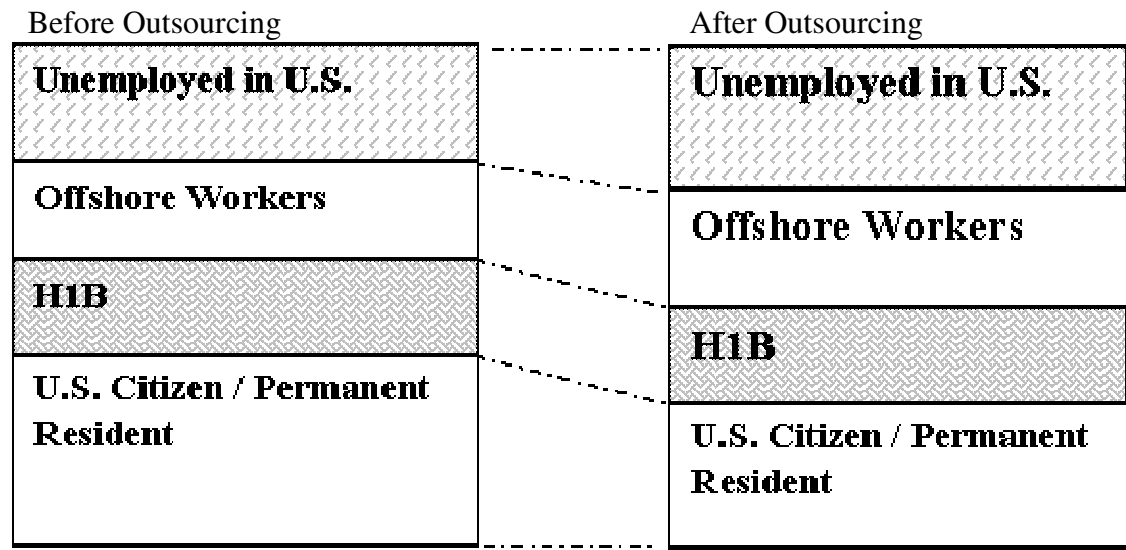


Figure 8. Perceived Employment Change for U.S. IT/IS Workers

The Study Contributions

The offshoring of IT/IS jobs has created new concerns with respect to training offered IT/IS future graduates. The changing market demand for these graduates requires

the attention of educators, prospective students and government. This study is expected to stimulate the needed attention at U.S. universities. The results of this research provides an understanding of steps universities and colleges are taking to offer relevant IT/IS training. It is expected to dispel some of the fears, concerns and stigma created by offshore outsourcing. Empirical data was collected and analyzed to help provide scientific evidence in support of, or lack of support on some concerns.

These results will help university administrators, and academia in general to have an informed knowledge on consequences, changes, perceptions and problems or solutions. Since the United States has been the high-technology leader in the world, offshore outsourcing is viewed as a factor that may affect this leadership or probably end it. The possible consequences of this leadership challenge can include ever decreasing IT/IS and computer science student enrolment, both nationally and from foreign countries. The innovation and development of new technologies within the United States might shift to overseas, depending on how the U.S. educational system responds to this phenomenon. Whereas the U.S. is a world leader in revenues coming out of IT/IS products and services worth 37.5 billion, with a trade surplus (United States Government Accountability Office, 2004), if the skeptics are right, the national economy may suffer in the long run. It is therefore relevant to have a proactive approach as opposed to a reactive one, in responding to offshore outsourcing concerns and influences. The stakes are high, but the challenge is not insurmountable.

Summary

Organizations chose to outsource offshore so as to achieve certain strategic, economic and technological advantages over their competitors (Kaiser & Hawk, 2004). Whereas hardware costs dominated the budget in the 1960's, software development was the highlight in the 1970's. How well the IT/IS services are managed determine the future of an organization's success. It is therefore important that an organization can maximize control and flexibility of its IT/IS services and resources. Greater flexibility is sought through offshore outsourcing of IT services.

Offshore outsourcing providers employ mostly new college graduates having low-level technical skills. They are therefore capable of low-level programming jobs and testing. Hawthorne and Perry (2005) have stated that: "Software engineering is changing in fundamental ways, so software engineering education must also change" (p. 643). The current software engineering curricula is inadequate to address the increasingly global software development paradigm shift. Offshore outsourcing will continue to grow as experience and knowledge in how to successfully manage an outsourcing relationship either wholly or in partiality increase. Firms will be reluctant to ship jobs offshore if they hold serious concerns about the security of systems and data. The offshoring process is characterized by both success and failure. The needed skills to ensure success can be costly both in time and money. It is sustained innovation that can maintain the United States in the competition of who can pay their workers the least. IT/IS college training has to produce student graduates that are offshore proof in the IT/IS job market. The U.S. being a world leader in IT/IS innovation, jobs running in the realm of new technologies may not be outsourced. The study research methodology is discussed in next chapter.

Chapter 3

Methodology

Chapter three gives the research methods and techniques used in this study. A theoretical overview of the methodology is discussed. A detail explanation of the specific procedures used is given. A research design map and concept diagram are provided. Each of the diagrams have corresponding explanations. Statistics on the study population and the sample used in the study are given. The research instrument is defined in this chapter. The steps taken for reliability and validity of the research data are outlined. Institutional review board requirements were considered and implemented.

Research Method

In conducting this study, the researcher followed a qualitative research style and associated techniques. The qualitative technique of structured interviews was used on the respondents. Maxwell (2005) suggests that in a qualitative study, the research design should be a reflexive process operating through every stage of the project. Such a research process is not adequately represented by a linear model because qualitative research has a varying order whereby different tasks and components must be arranged. Maxwell continues to describe this research approach as an ongoing process that involves a back and forth interaction between the different components of design, assessing the

implications of goals, research questions, methods and validity. This process neither starts from a predetermined starting point nor proceeds through a fixed set of steps. It rather goes through interconnections and interactions among the different design components.

The literature review from chapter two suggested that there are consequences on the offshoring of IT/IS jobs to nations outside the United States. These consequences or influences constitute the important elements for the offshore outsourcing constructs used in this study. The general perception of offshore outsourcing of IT/IS functions to overseas locations is that it reduces job availability in the United States. The job loss problem has had some implications to the IT/IS college education system. Students are discouraged by a perceived reduction in employment positions at graduation, causing the enrolment to go down in programs specializing in, or leading to IT/IS careers. If there are not enough students, the administrators take action in response to this shortage. Students tend to have less interest in taking courses in a profession where employment prospects after graduation are expected to diminish continually in the future. Those students whose interest in IT/IS is strong may consider pursuing a different career, or take areas of the IT/IS profession where offshore outsourcing is less likely to generate concern. Faculty in IT/IS programs have considered modifying their course training to emphasize areas in the IT/IS profession that are less likely to be influenced by offshore outsourcing. These research constructs are summarized in a research model based on Maxwell's (2005) generic research design map. Maxwell describes an interactive model of research design with five components: goals, conceptual framework, research questions, methods and validity. The research design map following this model is shown in Figure 9.

Figure 9 shows the research design map with the following characteristics: The goals in this research were aimed at capturing the participants' perspectives and consequences of IT/IS offshore outsourcing in U.S. universities. The participants are mainly IT/IS college administrators. The administrators include heads of departments and deans in the colleges under which IT/IS career training is housed. The research investigated the participants' concerns, consequences, and influences on IT/IS offshore outsourcing. The study was designed to identify interventions IT/IS program administrators in U.S. universities are making to address the undesirable consequences of offshore outsourcing.

The rectangles in Figure 9 are explained as follows: The goals rectangle lists what the study was designed to do. Among the issues, was identifying intervention measures of increasing student interest in IT/IS programs that are being adopted by college administrators. In addition, the changes in U.S. Universities caused by IT/IS offshore outsourcing were identified.

The conceptual framework rectangle lists what has been going on in the United States. Observed occurrences have been reduced IT/IS student enrolments, influenced by government statistics on job loses to offshore countries, media reports, and concerns raised by professional organizations on offshore outsourcing.

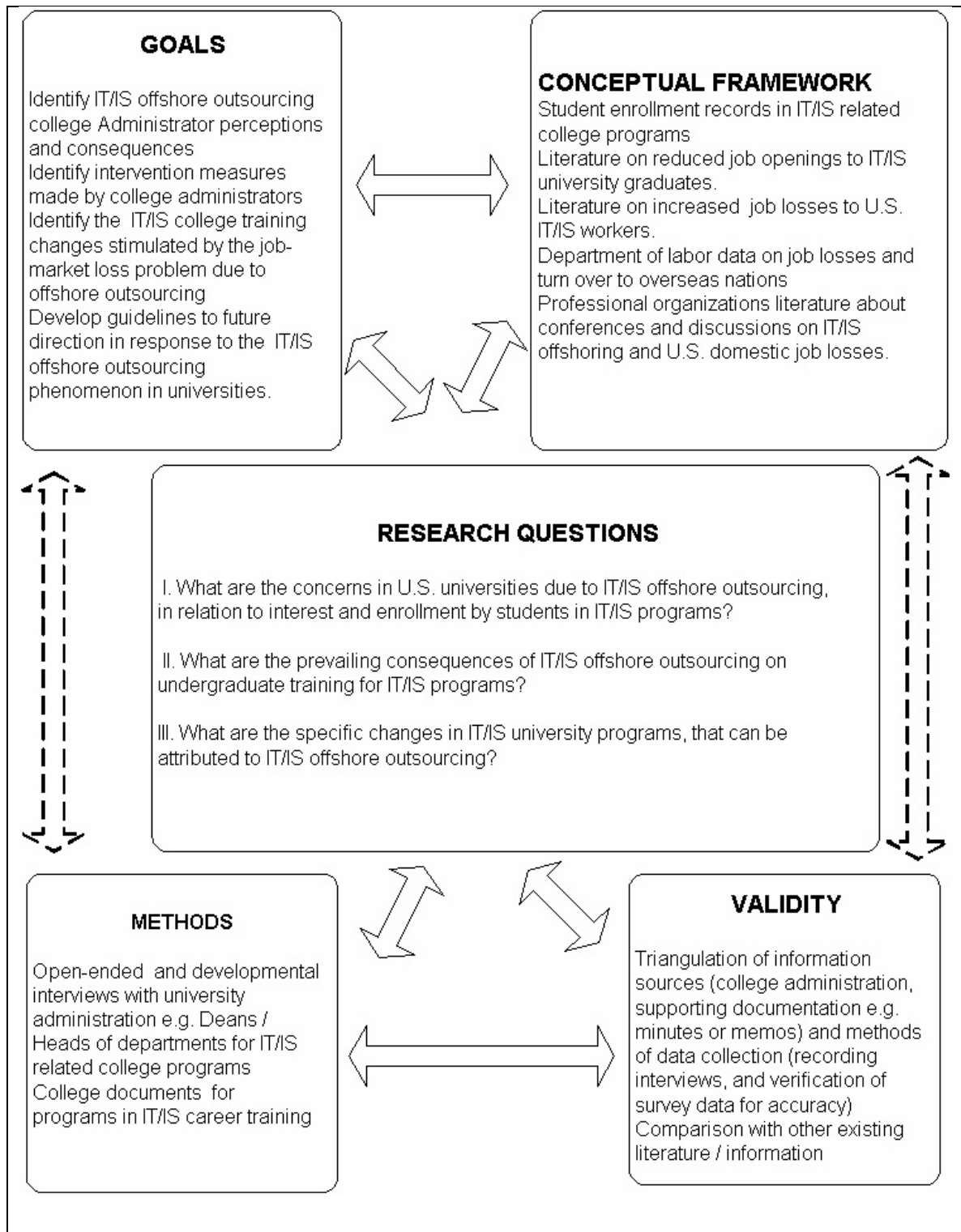


Figure 9. Research Design Map

The arrow connecting goals to the conceptual framework indicates that goals are linked to what is happening, because offshore outsourcing has created problems like low student enrolment, which stimulate some administrative responses in IT/IS programs. The rectangle on research questions lists three research questions that led to this study:

- 1) What are the concerns in U.S. universities due to IT/IS offshore outsourcing, in relation to interest and enrolment by students in IT/IS programs?
- 2) What are the prevailing consequences of IT/IS offshore outsourcing on undergraduate training for IT/IS programs?
- and 3) What are the specific changes in IT/IS university programs that can be attributed to IT/IS offshore outsourcing?

The arrow between goals and research questions' rectangle depict the process of how goals generate answers to research questions. The arrow between conceptual framework and research questions' rectangle depict that research questions are a consequence of the conceptual framework list.

The methods rectangle lists research techniques used to answer the research questions. The main technique was holding interviews with administrators, and studying documents. The arrow between the research question and methods shows that the questions were answered using listed research techniques. The validity rectangle shows how evidence for correctness of the results and data was established. The arrow between validity and methods rectangles shows the two items are directly related (or a method dictates a validity issue or threat). Dotted arrows imply the relationship is not direct (Maxwell, 2005). The research design map is portrayed as a Research Concept Diagram in Figure 10.

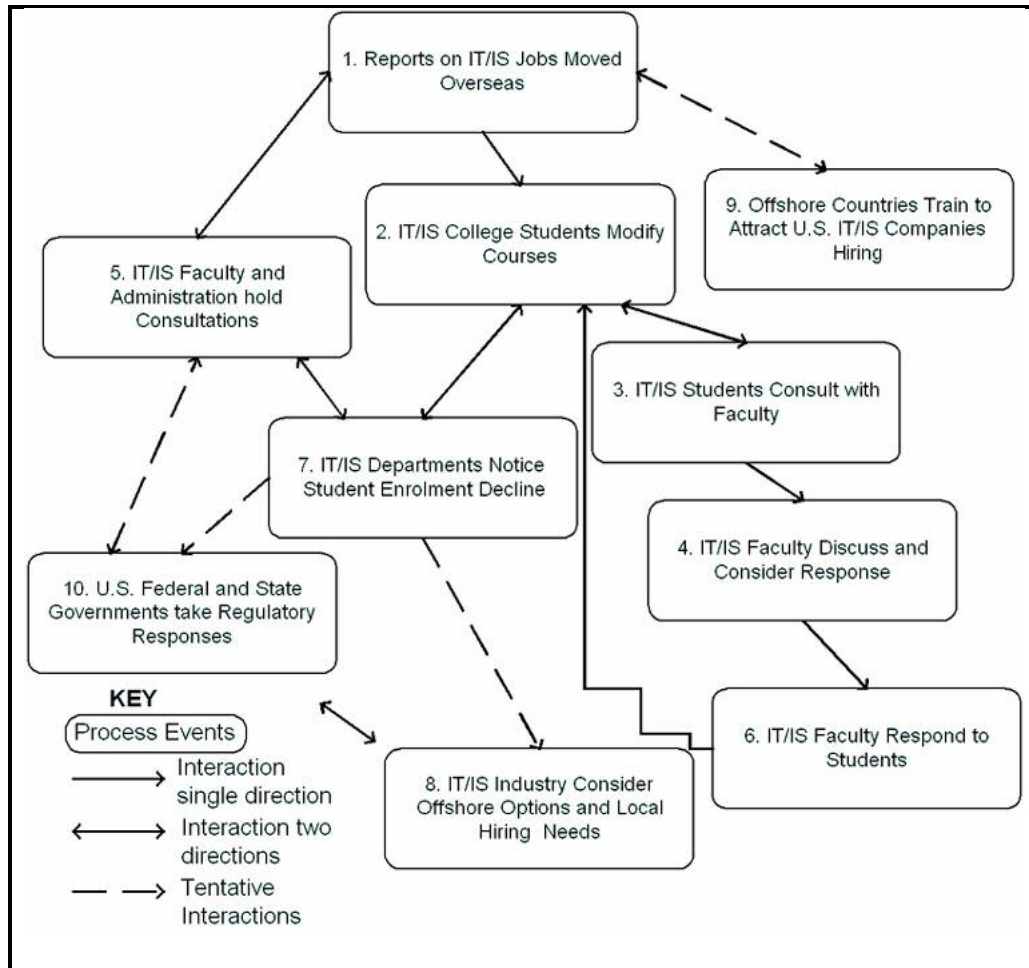


Figure 10. Research Concept Diagram

The concept map (Figure 10), depicts general propositions used in this study. The literature review, print and electronic media suggested that IT/IS offshore outsourcing was depleting available job positions for U.S. nationals and college graduates. It therefore discourages students interested in pursuing IT/IS related career training at universities. This phenomenon has attracted the attention of IT/IS college administration. They are looking for answers on how to respond to the offshore outsourcing trends and consequences.

Specific Procedures Employed

The survey instrument is given in Appendix A. A pilot test of the survey instrument was conducted during summer 2006. A transcript of the pilot study result is found in Appendix B (a worthwhile read with some unique occurrences). During instrument design and piloting, consideration was given to, content, ease of use and readability of the questions. Help was sought from content experts. This was done before administration of the survey instrument.

The population in this study are mainland U.S. public universities offering 4-year undergraduate degrees in IT/IS programs. The United States was split into a stratified sample of four regions. These regions are divided into the Northeast, South, Midwest and West. Regions having the following states:

- South (14), VA, WV, KY, NC, SC, TN, GA, FL, AL, MS, AR, LA, OK, TX;
- Northeast (12)-ME, VT, NH, MA, CT, NY, RI, NJ, PA, DE, MD, DC;
- Midwest (12)- ND, SD, NE, KS, MO, IA, MN, WI, IL, IN, MI, OH;
- West (13)- WA, OR, ID, MT, WY, CO, NM, AZ, UT, NV, CA, HI, AK.

The national center for education statistics web page <http://nces.ed.gov/ipeds/cool> lists 605 public universities on the U.S. mainland that graduate 4-year degrees in computer science and/or information systems. The student population for these universities range from 86 to 54,169. A minimum population selection criteria of 5,000 was used as a cutoff in this research. This criteria includes 371 universities in the four regions; West, Northeast, Midwest and South. Excluded from this number are universities from two states Louisiana (LA) and Mississippi (MS) that were affected by hurricane Katrina. It was considered that these two States would not accurately represent (bias) the

study results. A random selection from the south and northeast regions constituted the sample population of twenty universities. This number was limited by research funds, and inability to conduct more university interviews (please refer to the research protocol in Appendix C). The two regions; Northeast and South, were randomly selected from the four regions using statistical techniques (details of this method is explained later). The Northeast and South constitute a total of 208 universities, or 56% of those satisfying the selection criteria for the whole United States (see Appendix D). The sample size is about 9.2% of universities in the South and Northeast; or 5.4% for the whole United States.

The method used in randomly selecting the study sample was conducted as follows: The Microsoft excel analysis toolpak for random number generation was used. Microsoft excel has a function for selecting a random number between a specified range of two numbers, such as;

Random number = function(start number, end number).

Table 4 shows numbers of universities existing in the stratified four U.S. regions. It includes numbers for those universities satisfying the population selection criteria ($\geq 5,000$), and excludes States affected by hurricane Katrina. The universities were selected in two parts (or categories); One part with a student population range of 5,000 to 9,999 and another with a student population $\geq 10,000$. The method was used in order to include smaller universities (or colleges). However, all the institutions met the criteria of offering 4-year undergraduate degrees in IT/IS programs (or majors). This selection criteria is provided for at the national center for education statistics web page referred to earlier.

The northeast student population range of $\geq 10,000$ has 42 universities (see Table 4). The excel program generated random numbers from 1 to 42, hence giving an equal chance to any university in the region to be selected. The list of university names was alphabetically arranged (sorted). Each university name in the sorted list was assigned an ascending order number in increments of 1, starting with 1, to the descending alphabetical listing of university names. The sequence of excel generated random numbers determined the order of contacting a university for an interview, corresponding to its number position in the alphabetical listing. For example, if the first generated random number was 33, the university name with 33 as a number on the alphabetical list was contacted. This process was repeated for each grouping as given in Table 4. The specific numbers that were generated for these universities cannot be given as a condition for satisfying the IRB confidentiality requirement. The participation of administrators was granted on a promise to adhere to this requirement.

Table 4. Number of Colleges and Universities

Region	Student Range	No of Universities
Midwest	$\geq 10,000$	62
Midwest	From 5,000 to 9,999	32
West	$\geq 10,000$	56
West	From 5,000 to 9,999	13
South	$\geq 10,000$	76
South	From 5,000 to 9,999	41
Northeast	$\geq 10,000$	42
Northeast	From 5,000 to 9,999	49
	TOTAL	371

For 20 universities where the study was conducted, the population range of universities with student numbers > 10,000 were eleven and those with a 5,000 to 9,999 range of student numbers were nine. Of these universities, 4 are among the best 100 in the United States, as ranked by the Princeton Review (Princeton Review, 2006). Divided into regions, there are eleven universities from the northeast and nine from the south. The student number statistical averages (or population measures) for the randomly selected universities are shown in Table 5. The averages for the twenty universities (Student Numbers column) have a close comparison to those for the combined U.S. northeast and south regions overall.

Table 5. Participating University Student Number Averages

Measure	Student Numbers	Regions Overall
Average	16,751	14,685
Median	11,464	11,278
Maximum	49,693	54,169
Minimum	5,340	5,041

The Interview Process:

Each websites for the randomly selected universities was visited to retrieve contact information for administrators, these are specifically heads of department or deans in IT/IS related programs. The retrieved information included name of the university department or college, address, telephone number, email, and names of individuals for the dean and/or head of department. It took an average of 20 minutes to retrieve this information for each website, and sometimes more than one attempt was needed. The possibility of an email message rejection from an unknown sender (the researcher) to a targeted administrator's email was real. The researcher considered that

making a phone call was a better approach, or physically visiting an office to get an appointment. A number of phone calls ended up to the voice mail (and sometimes full voice mails), or were turned down by the administrative assistant. Physical visits were planned and done for specific areas spanning a number of states. A central residence location was chosen based on distances between universities (see Appendix E). Distance calculations were made, and a decision taken on how best to navigate surrounding university locations.

There was difficulty in getting appointments. This led to sending a bulletin message on ISWorld so that the academic community was informed about the ongoing study. This was done with permission from the dissertation committee (see Appendix F). There was a good response after the ISWorld message posting. Some college administrators expressed direct interest to participate by email reply to the bulletin message. A reply was sent to them suggesting an interview would be conducted if the excel generated random list included their university. A thank you note was included in this reply. This eliminated Volunteer Bias or Self-Selection Bias. The random number generation was done once for each grouping of universities to avoid selection bias.

Permission was sought to conduct research in each of the randomly selected universities. This was done through either a telephone call or an email request to the head of department or dean's office. Where both contacts were available, the dean was the first to be contacted. If the dean was not available, the head of department was contacted. In some cases, the dean referred the researcher to the head of department or someone they considered best suited for the interview. In other cases, the Dean's secretary would suggest a head of department, especially if the Dean was not available or busy. At the

first contact of a respondent, permission was requested to conduct the research. An appointment was then setup, if the permission request was granted. Interview questions were emailed to the respondent for review, and before the scheduled appointment. The respondents were 4-deans, 14 department chairs, a director for undergraduate studies and an Assistant Professor. After 20 interviews were completed, permission to write the final report was requested from the dissertation committee. The permission was granted (see Appendix F).

Some interviews were conducted in a participants' office and others by teleconference. At the start of each interview, the following words were said:

“Thank you for being available for this interview. I request for permission to record the interview. I request to acknowledge you are above 18 and are voluntarily participating in this research.” The respondents accepted the acknowledgement before the each interview continued. At the end of the interview, the respondents were notified that a transcript would be emailed to them for validation of the content. A sample email for this is found in Appendix G. Thirteen participants responded with edited transcripts, or no changes. A reminder email was sent to the remaining seven respondents (See Appendix G). Three respondents replied within one week indicating the content was accurate (for 2) and a minor change (for 1).

Presentation of Results

The process of presenting results started with writing interview transcripts. This happened within 24 hours after the interview. There is a fundamental view that data analysis in qualitative studies starts simultaneously with data collection, and is also part

of the design process. Data analysis was continuously done as the interview process progressed.

There are three proposed analytic processes that may be used in a qualitative analysis of interview data: 1) writing memos 2) coding and thematic analysis, categorizing strategies and 3) narrative analysis - connecting strategies. Memos or notes were written during and after each interview. Some of the data was coded into spreadsheets while rearranging it into categories that facilitated comparison between things of the same category (See Appendix H). Some categories included, list of concerns by administrators, training changes, organizational entities that universities consulted or worked with in addressing offshore outsourcing or student enrolment declines.

Categorization helped arrange the data into themes and issues. Some of the themes were college administrative measures, the role IT industry has played, or interventions from the federal government like support for programs that will enhance IT/IS enrolment and interest from high school graduates. A repeated activity of intervention at high schools by universities was a common theme for promoting the IT/IS career.

The Likert score was used to determine the level of importance for a category. For example, a score of 3 or above indicated that an administrator had concerns on offshore outsourcing. Interview questions 1 to 16 were followed for such an administrator (see Appendix A). Any score below 3 on the Likert scale determined following interview questions 1, 2 and then 17 to 23. There was one respondent that suggested being neutral, but scored a 3 on the Likert scale. This administrator was grouped together with

respondents having concerns on offshore outsourcing. Having a concern did not mean being in favor of or against offshoring, but rather that it merits remedial steps.

The Research Instrument

The interview questions are contained in Appendix A. As mentioned earlier, these questions were pilot tested, reviewed and edited with help from content experts. The instrument development process was done with help from six universities. The expert panel included two IT/IS departmental heads, one college dean and four faculty members (Gable, 1993).

The instrument development process was started with questions relating to research questions. The questions were twice reviewed by content experts. Their comments were merged into the research instrument and then pilot tested. The correlation between research questions and interview questions is given in Appendix I. A further explanation of this correlation follows:

Research question I addresses the concerns of college administrators on reduced enrolment and interest of students in IT/IS programs. It is expected that if the enrolment is low, administrators will know to what percentage the enrolment has dropped, and the attached level of importance (using a Likert scale for example). Research question II addresses consequences of the enrolment concerns. What are the corrective steps or interventions administrators are implementing in their IT/IS programs? Are these interventions perceived to be working and if so, which ones are the most effective? This question was used to elicit information on the review of internal processes at colleges,

plus involvement of external agencies like government, IT industry or professional organizations.

Research question III addresses specific IT/IS program changes that administrators have implemented. This question elicited information about new courses, policy changes, and recruitment drives. This included new collaborations or activities that never existed before, but have been adopted by IT/IS administrators (additional detailed explanation of the correlation between research questions to interview questions is provided in Appendix I).

Reliability and Validity

Reliability and validity were considered under the umbrella of qualitative research techniques. Neuman (2003b) suggests that “Most qualitative researchers accept the principals of reliability and validity, but use the terms infrequently because of their close association with quantitative measurement (p. 184).” The consideration of reliability and validity implies that the principles for qualitative studies are applied differently in practice (Neuman). Qualitative studies use interviews, document studies, participation, and recording to ensure the reliability of the information gathering process. These research techniques were used and followed in this study. The interviews were recorded electronically with one exception, where the respondent declined giving permission to do so. However, this respondent answered follow up questions after the interview. He also approved the final interview transcript.

Validity refers to the correctness or credibility of a description, explanation, conclusion, interpretation or other account (Maxwell, 2005). The idea of objective truth is

essential in validity so as to give grounds for distinguishing accounts that are credible and those that are not. A key concept of validity is the validity threat, which is the way conclusions and explanations might be wrong. Validity is a research component used to identify and rule out these threats.

Arguments for validity are based on two types: judgmental and empirical (Gable, 1993). Judgmental evidence may be gathered prior to the actual administration of the research instrument to the targeted respondents. The empirical evidence is argued after the research instrument has been administered to the study respondents.

Brinberg and McGrath (1985) postulate that: “Validity is not a commodity that can be purchased with techniques (p. 13).” It addresses the relationship of derived conclusions to reality. Maxwell (2005) argues that validity is a goal rather than a product; it is never something that can neither be proven nor taken for granted. Maxwell also contends that validity threats are made implausible by evidence, and not by methods. Qualitative researchers lack pre-planned comparisons (that quantitative researchers have), or statistical manipulations that control plausible threats, but must rule out most validity threats after the research has begun. This can be achieved by using evidence collected during the research to make alternative hypotheses implausible. In this research, validity threats were addressed in the following ways:

- Providing explanations on circumstances related to the researcher’s bias.
- Testing the validity of conclusions, where conflicting information was found an email was sent to the respondent for validation of content.
- Reviewing evidence from “rich data”, the electronic recordings.

- Running respondent validation through feedback drawn by the researcher from the administrators (emailed interview transcripts for validation).
- Searching for discrepant evidence through the identification and analysis of data that could not be accounted for by the interpretations or explanations.

Resources Used

- College administrators, dean / head of department in IT/IS departments.
- IT support especially for data storage at the Graduate School of Computer and Information Sciences, Nova Southeastern University.
- Transportation, accommodation, funds for travel, and telecommunications

Necessary Hardware / Software Resources Used:

- A Database Management System, word/spreadsheet processing
- Library and online research materials
- Portable computer, printer and electronic recording equipment

IRB Documents

The Institutional Review Board (IRB) approval documents are in Appendix J.

The research protocol is in Appendix C.

Summary

A qualitative research style and associated techniques were used in this study. The consequences or influences of offshore outsourcing constituted important elements for the constructs used in this study. The movement of IT/IS functions to overseas locations is generally perceived to reduce job availability in the United States. The job loss problem has had some implications on the administration of IT/IS college education. Students are discouraged by a perceived reduction in employment positions at graduation. One of the consequences is the reduced student enrolment in IT/IS programs. Students tend to have less interest in taking courses in a profession where employment prospects after graduation are expected to diminish continually in the future.

The goals in this research were aimed at capturing the participants' perspectives and consequences of IT/IS offshore outsourcing in U.S. universities. The interviewed participants were administrators including heads of departments and deans for colleges offering undergraduate IT/IS career training. The study was designed to identify interventions IT/IS program administrators in U.S. universities are making to address undesirable consequences of offshore outsourcing. The United States was split into a stratified sample of four regions. A random selection from the south and northeast regions constituted the sample population of Twenty universities, having populations of 5,000 and up to about 50,000. Of these Twenty, Four universities are ranked among the best 100 in the United States, and ranked according to the Princeton Review. Concerning the interview processes, reliability and validity were considered under the umbrella of qualitative research techniques. The study results are discussed in the next chapter.

Chapter 4

Results

Chapter four provides a thematic analysis of the results in this study. The respondents are divided into two groups, those administrators with offshore outsourcing concerns and those without concerns. The views of administrators on offshore outsourcing are documented in this chapter. Trends are given on student enrolment and employment rates for IT/IS programs. Details on the involvement of different organizations, IT industry and government are given. The advantages and disadvantages of offshore outsourcing from the perspective of IT/IS college administrators are listed. The changes being advocated and pursued by IT/IS college administrators are enumerated. The other factors believed to influence student enrolments are listed. Results of successful interventions to increase IT/IS student enrolments are given in this chapter.

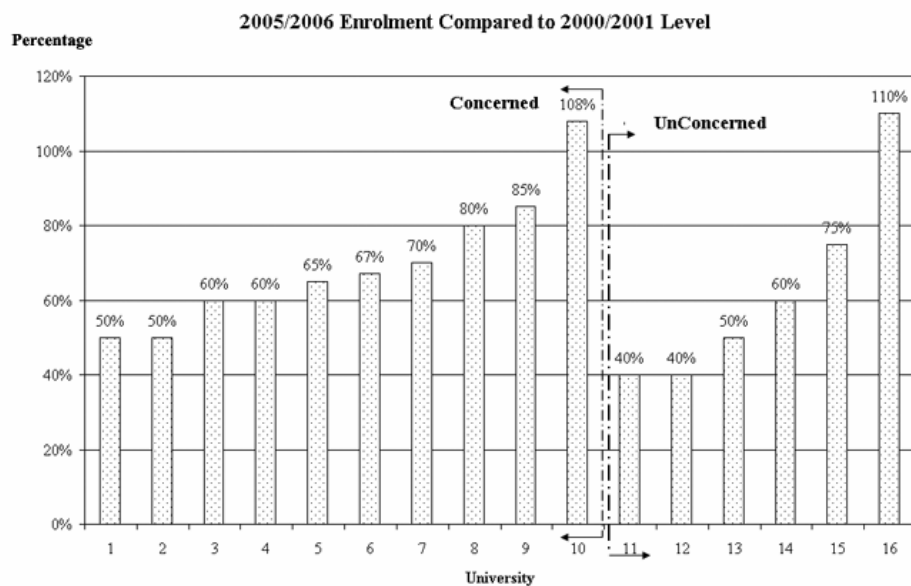
Findings

The final study involved twenty universities, but six more universities had participated in the pilot study phase. The student population for these universities ranged from just over 5,000 to nearly 50,000. The total student population at the 20 universities is 335,017. The average student population for the 20 universities was 16,751. The criterion for an administrator having offshore outsourcing concerns was determined on a

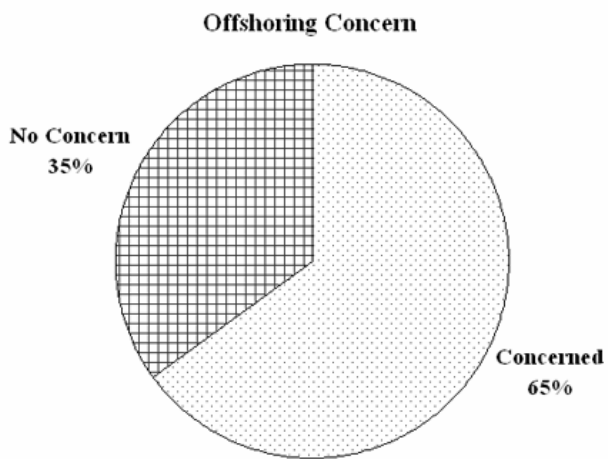
Likert scale of 1 to 5. A Likert score of 3 and above given by an administrator was used to categorize the administrator as having concerns for offshore outsourcing. The majority (65%) of administrators had concerns for offshore outsourcing (see Figure 11). They perceived offshoring as being a cause (either directly or indirectly) for reduced student enrolments in IT/IS college programs. Even with this majority, 31% considered offshore outsourcing as a long-term positive phenomenon.

A discussion of Figure 11 will follow. It gives summary data from respondents in this study. It also shows how administrators have responded using several interventions. The information on changes in student enrolment from 2000/2001 to 2005/2006 is given in Figure 11A. The x-axis represents universities, but they are not listed for reasons of confidentiality. Figure 11A shows that enrolment is below 100% for all universities in this study except two. The concerns for administrators are depicted in Figure 11B, showing that 65% are concerned about the offshore outsourcing phenomenon. Figure 11C shows 77% of the administrators have implemented course changes or are in the process of doing so.

A



B



C

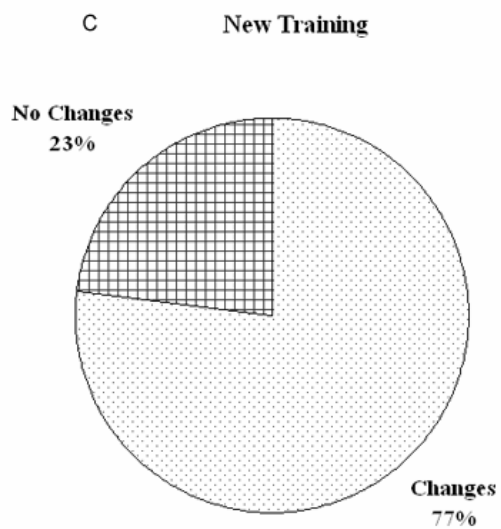


Figure 11. Perspectives on Histograms

Whereas the minority of administrators (35%) did not have concerns for offshore outsourcing, they reported reduced student enrolments, and all of these administrators except one, had reduced student enrolments ranging from 40% to 75%. The university having an exception had an increased enrolment of 110%. For most of these universities, these numbers reflect a comparison with the academic years 2000/2001 and 2005/2006 enrolment numbers. Overall, the 2005/2006 average enrolment for fifteen universities was 71% compared to the historical high of 2000/2001. Five of the universities did not provide their enrolment numbers for this particular time frame.

Administrators with Offshoring Concerns

Perceptions on Offshore Outsourcing

Ninety two percent (92%) of the administrators held the view that offshore outsourcing makes companies utilizing offshore services to be more profitable than those that do not. This suggests that companies save money by paying less for the labor services compared to what they would spend locally in the U.S. This can be argued further that cost savings are the primary objective for offshore outsourcing. The literature research outlined in chapter two supports this view. There are both advantages and disadvantages created by offshore outsourcing. Some of the advantages administrators suggested include: it encourages innovation, companies can be more profitable, helps less developed economies overseas, reduces long term liability like retirement benefits, provides companies greater flexibility (hiring and firing), provides a platform for expanded markets overseas, profits that are accumulated create opportunities for new investments, provides a leverage for smaller companies to afford services they would

otherwise not afford, and provides access to overseas talent. The reduction of enrolled students in IT/IS programs implies that students who are more highly motivated register for IT/IS training. Some respondents suggested that students of a high quality, or the cream of the crop will remain in IT/IS programs.

The administrators identified disadvantages for offshore outsourcing including: reduced job positions in the U.S., compromised product quality from overseas, the connection with the local customers may not be as strong, introduces security (privacy and confidentiality issues) vulnerabilities, intellectual property rights may face a greater risk of violation, it damages the reputation for an IT/IS career, it is demoralizing to IT/IS personnel whose jobs may be offshored, and causes suffering by families directly affected by this phenomenon. The distance and time differences between the U.S and offshore countries was among disadvantages mentioned. Administrators suggested that the level of service delivery across continents, and in different time zones is not as good as when both customer and service provider are living in a closer proximity. Respondents said that offshore outsourcing creates a foreign country dependency syndrome. The political or financial instability in the offshore countries was therefore quoted as an added risk.

It was mentioned that offshore outsourcing is targeting low level programming jobs, or those jobs that are repetitive in nature. Administrators suggested that high level design or programming jobs are less likely to be offshored overseas. Either the high level jobs are expensive to outsource, or the needed skills needed are not readily available overseas. In addition, it was said that, high design technical work that are the “crown jewel” of a company, or give an IT firm the competitive advantage over its rivals may not

be offshored overseas for security reasons. Administrators had the view that interest for protection of intellectual property rights outweigh the financial benefit in labor savings by offshoring such work. Work activities that require sophistication lack an enabling environment for offshore workers to innovate and grow. It was further argued that U.S. IT/IS workers can concentrate on these areas of complexity so as to ensure future employability. “Sophisticated work which involves an understanding of business processes cannot be outsourced offshore. Offshore personnel lack the environment (context), which limits their ability to innovate” (Anonymous, personal communication, February, 2007).

Offshore outsourcing was perceived by some administrators as having a short-term negative consequence of lost jobs by American employees. There was a corresponding argument that as jobs are moved offshore, new job types are created onshore in return. It was suggested that companies that engage in the offshoring of jobs are expected to make financial savings, therefore creating funds for new investments in the U.S. New job types created include management of offshore activities, coordination and control of offshore and onshore development activities. The other opportunities offshoring was said to contribute is expansion of markets in the destination or offshore countries. Services and products can more easily be sold or expanded in these countries, administrators said.

Administrators suggested that alternative counter measures to offshore outsourcing, for example government regulation or protectionism, are technically incompatible with global trade agreements. Globalization has freed or is intended to free world markets. The World Trade Organization (WTO) and North American Free Trade

Agreement (NAFTA) are elements favoring global trade. The free market economy that exists in the U.S. means that companies can buy and sell services, or hire workers where the return on investment increases the shareholder's value. Administrators asserted that attempting to create barriers to the offshoring phenomenon would violate some of the very principals that led to the formation and ratification of the WTO and NAFTA. One administrator expressed that: "Fighting offshoring is going to be a losing battle. Why waste time on something you cannot stop?" (Anonymous, personal communication, February, 2007).

The Desirable Influences of Offshore Outsourcing

There was a general view that offshore outsourcing will be good for the U.S. in the long-term. Some administrators argued that media exaggeration and "misrepresentation" have escalated the concerns, but this will diminish with time.

There has been a media explosion about offshore activities. Newspapers say there are no IT/IS jobs in the U.S. This has been the cause for an enrolment crisis in America. However, we have students coming from India and some stay to work in the U.S. Others go back to their home country. Offshore outsourcing may be good for the U.S. in the long term. (Anonymous, personal communication, February, 2007)

Administrators reported innovation as being a main driver for the U.S. economy, therefore new product areas and advanced technology that are less prone to offshoring were projected to be job creators in IT/IS. Offshore outsourcing was expected to spur competitiveness and innovation, which will result into creation of new products and services. Administrators contended that the standard for valuing the level of education being offered to students in IT/IS programs is being challenged. Questions administrators raised in response included: Can students acquire the relevant skills to be able to compete globally? How fast can the education system adapt and position itself steadfastly with the

mantra of being at the leading edge of technology for years to come? The level of jobs going offshore was suggested to be rising in sophistication as available offshore skills developed. If the U.S. students can be agile, with the needed facilitation of an adapting U.S. education system, the level of training must continuously go higher to maintain the U.S.'s superiority, administrators further argued.

The Undesirable Influences of Offshore Outsourcing

Some of the influences administrators attributed to offshore outsourcing included: reduced student enrolment, the kinds of jobs available to graduating students have changed, consulting jobs available to faculty have changed, it has also imposed a reduced number of majors and electives in IT/IS programs. Respondents mentioned that as jobs get moved offshore to overseas countries, the available positions IT/IS hiring companies can offer fresh graduates will continue to fall. This process sends a chilling message to all players in the IT/IS education system; students, parents, guidance councilors and educators. Students and parents have had access to media reports on the loss of jobs to overseas low cost labor nations. Whereas a thin line exists between perception of the magnitude of the problem and how individuals respond, its undesirable consequences have been observed and cannot be ignored. Administrators suggested that the lack of adequate information and the media explosion about the lost jobs, all play negatively to prospective students and the public in general. This knowledge was associated with the reduced student interest in IT/IS programs. It was reported that this influence has been reflected in the reduced IT/IS student enrolments, and increased attrition rates by registered students. Administrators have had both students and parents asking about the future of jobs in IT/IS careers.

Administrators argued that offshore outsourcing reduced the competitiveness of U.S. IT/IS workers. When an overseas employee can be paid a fraction of the salary for a U.S. worker with equal job responsibilities, this was said to be a competitive issue. Those IT/IS workers in positions that are prone to offshoring face the daunting reality of salaries going on a downward spiral. Administrators recognized that information transported across boundaries of the United States raises some questions; Who is liable for security breaches, what kind of network vulnerabilities are opened up for abuse? There is the inherent security, intellectual property, and privacy problems that need to be addressed. Can consumers of the services provided by firms conducting offshore operations accept these conditions without a negative backlash? It was mentioned that there is evidence of consumer reprisals, one example is Dell Inc., which returned customer support services back into the U.S.

Another issue administrators raised about offshore services is product quality. There is an assumption that offshore providers have similar or even better talent by their U.S. competitors. Whereas products and services can be created at a better price, the quality of such products remains questionable. Administrators argued that the time taken to develop mature technologies harnesses skills, experience, a supporting infrastructure and technical know how. When some of these important aspects fall short in offshore countries, then quality is compromised.

Respondents suggested that a gap exists on the perceived loss of jobs by those individuals doubting the future of IT/IS careers, and the available jobs for new graduates. Most universities indicated that their graduating students succeed in getting IT/IS jobs on the market (see Figure 12).

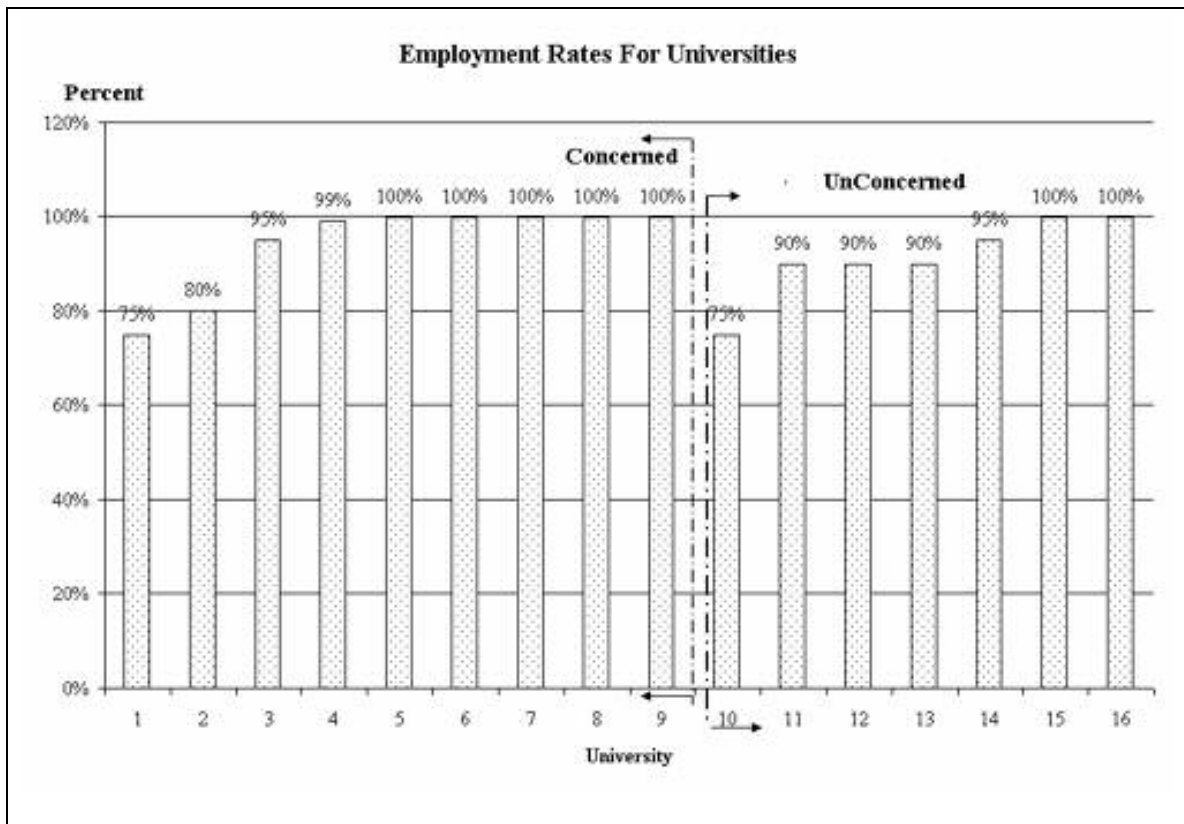


Figure 12. Graduate Employment Rates

An average calculated for fourteen universities that provided employment estimates had 90% graduating students getting IT/IS jobs of their choice, and within 6-months after graduation. However, it was said that if the U.S. fails to innovate and maintain the global lead in science and technology, the offshore outsourcing trend may become an economic recipe for disaster. “The failure to recognize competitiveness as the next domineering force in a global economy, is likely to make negative concerns on offshore outsourcing a self-fulfilling prophesy” (Anonymous, personal communication, January, 2007).

IT/IS Career Advocacy

Administrators acknowledged changing marketing strategies for IT/IS training programs. Outreach programs have been designed for high school, k-12 and middle school students. Some universities conduct these programs on a regular basis. The number of teaching hours for faculty were reduced by one university to provide time for high school outreach programs. The targeting of potential students includes; visiting of high schools, presenting lectures at high schools, conducting regional and local competitions, the implementation of summer programs, and solicitation for grants and internships. Activity titles in these interventions have gone with names like; “a computer science day”, “programming competition”, “essay writing to win a scholarship”, “open house”, “summer camp”, “developing a technology company poster”, “technology debate”, “student project design” and “technology learning institute”. Another reported marketing strategy was targeting special groups like women and under privileged groups or minorities. Students that have not chosen a major but attend college are invited to special events. Brochures and pamphlets have been updated, and career guidance councilors provided with more information, and educated on the current potential for IT/IS careers.

A respondent said the following: “We have a computer science day, which before the reduced enrolments primarily targeted college students. We have now included high school students into this day. One of the activities is performing a quiz show competition” (Anonymous, personal communication, January, 2007). The drive to attract the millennium generation is another strategy that a particular college department has employed: “The Dean has posted a profile on MySpace.com to attract new students. We

are attempting to be attractive to the millennium generation, those who have grown up with technology gizmos” (Anonymous, personal communication, January, 2007).

The public perception of science and engineering professions in the U.S. was reported to be very low. Administrators suggested that the popular culture seems to be more focused on music, the blockbuster movies or videos, the Hollywood celebrities, dancing with the stars, or who the next American idol winner will be. Although hi-tech makes the popularity scenes possible, the individuals whose brain power uses science and technology to make instant celebrities “come to life” get lost in the background. Against this backdrop, advertising campaigns using print and electronic media are being adopted to improve the image of IT/IS careers. This includes television, the internet, and popular social websites like Myspace.com, etc. The main message in these interventions is that IT/IS is still good and is even getting better.

Creating an Enabling Environment

The campaigns and interventions used by administrators to attract students have been highlighted in the previous section. Sustaining the momentum and maintaining the excitement and morale of enrolled students is equally important. Universities have come up with programs, courses and majors that hold the promise of offshore-proof skills training. Some of these new programs include bio-informatics, information security, software project management, global work team skills, information technology infrastructure, and more. The strengthening of scholarship opportunities and grants for IT/IS career training is another tool that is being used to create an enabling environment for increasing student enrolments. These scholarships are solicited from a number of

sources, federal and state government, IT industry, and research funds from the Nation Science Foundation.

Enrolled students are provided with more information about the IT/IS career training environment. Lecture series are organized, and offshore outsourcing demystified. Internship opportunities are explored and provided to students. An approach of even a courtesy telephone call to new students admitted to IT/IS majors was perceived to have a positive effect. Continued support to students and the availability of faculty to advise and answer student questions, help encourage students pursue an IT/IS career training.

Impediments to Attracting Students

Administrators suggested that an image problem exists for careers in IT/IS. There was the fallout from the dotcom bubble bursting. The image that a high tech whiz-kid is no longer easily turned into a millionaire over night does not help the already struggling IT image problem. Computer nerds are perceived as anti-socials, male chauvinists, loners and having no life to share. Students seek networking social skills, especially women. It was expressed that educators have not done a good job to show that social and networking skills can be achieved in an IT/IS career. When technology and computer gizmos are proliferated, the hi-tech buzz loses steam and the attraction it once had during the technology boom. It was further argued that there is a resilient “know it all” syndrome, because technology and computers are ubiquitous in today’s society.

Expressed in the words of an administrator:

The luster and attractiveness of IT/IS to new students has been damaged, and whether it will regain this glory is a concern. The administrative question to consider: Will IT/IS ever come back, and what will the future number of majors offered be? (Anonymous, personal communication, January, 2007).

Another administrator expressed a similar sentiment like this:

There is a lot of technology gizmos high school kids have today. This creates a deception to students thinking that they know the technology. They are “saturated” with computerized gadgets, so this does not create a ‘buzz’ or ‘excitement’ about pursuing a career in an ‘already familiar’ field. This is a very powerful factor. (Anonymous, personal communication, February, 2007)

Adaptation by College Departments

Sixty two percent (62%) of the administrators that had concerns for offshore outsourcing implemented changes in student programs to specifically address offshore outsourcing influences. University departments are using a number of approaches to adapt to the offshore outsourcing realities. “The challenge to our education is to prepare our students for a profession where offshore outsourcing is a reality. It creates opportunities and not a threat to the country as a whole” (Anonymous, personal communication, January, 2007). One of these approaches can be said to follow Fulbright and Routh’s (2004) vendible model (see Figure 5). This model recognizes the existence of a shifting and slanted line (a vendible line) on a pyramid of the IT/IS corporate ladder. The jobs below the vendible line are most likely to be offshored. The jobs above the vendible line are the focus for some universities. In this case, some universities are advocating and encouraging students to take double majors. The students are also urged to learn skills that are less specialized, but instead have a wider scope (or a wider field of study). A diversified training regime has been adopted in some college departments. The diversity is an attempt to impart or provide an opportunity for multi-disciplinary learning skills for students. This is expected to make students more versatile in the global job marketplace. Quoting an administrator: “We offer students a joint degree in both

hardware and software. As long as students receive both training, it makes them compete more effectively” (Anonymous, personal communication, January, 2007).

Strategic changes have been made in the training of students. In some cases student internships are mandated. Research work in capstone projects is required, especially for students that want to conduct research, or those intent on pursuing graduate school. Curriculum reviews is another approach universities are using. This is conducted on a regular basis, and industry collaboration is sought in the curriculum evolution process. The reviews seek IT industry recommendations, and also evaluate content and curricula methods. New course training and majors have been developed. Some of these include information security, bio-informatics, training in language and cultural differences, computer games, ecommerce, project software management, system integration, software acquisition, etc. There was a plan to introduce an online university degree as an affront to get more students into IT/IS programs.

There was a reported introduction of internationalism in the curriculum. Issues on being effective as a global work team member are addressed. Internships are sponsored for U.S. students to go and work with offshore vendors overseas. These internships are provided by vendors providing offshore services to U.S. companies. Collaboration of IT/IS programs with other departments is another action taken to increase student enrolment. Departments reported in this collaboration include management, accounting and biology. One of the departmental collaboration was aimed at the development of a project used in a regional competition. Another collaboration involved coordination of the types of courses offered as electives.

A proactive approach to increase and attract new students has been adopted in some universities. These approaches include participation in competitions at both local and regional levels. Student competitions play a double role of being an advertisement campaign, and also create the buzz that IT/IS designers develop cool things students can be proud of. It builds a good image and hence becomes a source of attraction for the future students. Visitations are made to high schools educating students on the prospects and advantages of IT/IS careers. Other interventions include strengthened student advising and tutoring to retain students. These interventions help lower attrition rates, and hence improve the number of students graduating in IT/IS programs. There is also the need to satisfy accreditation benchmarks. Accreditation requires IT industry collaboration, which provides a valuable link in informing and defining the direction for needed skills for future job positions on the market.

The IT Industry's Involvement

Seventy seven percent (77%) of administrators with offshore outsourcing concerns have had direct IT industry interventions (or consultations) to specifically address influences of offshore outsourcing. The recognition of the role of IT industry by a majority underscores the importance universities attached to this resource. It creates value learning from the very perpetrators of offshore outsourcing, for example, what IT companies expect and can advise on desirable skills for new IT/IS hires for the local U.S market. The knowledge universities learn from the IT industry puts a correct perspective for both local employment opportunities and also employment within a global perspective. The IT industry holds keys to the future of IT/IS offshore outsourcing. The IT industry's invaluable information sharing, is a critical asset in defining, projecting and

determining critical training needs. This can ensure employability of future graduates.

The literature research showed that information flow on IT industry's offshore activities is very limited due to political and/or strategic reasons.

The gaining of practical skills by students through internships or corporative work programs is realized with input and support from the IT industry. There is another role industry was reported to be playing through facilitation on innovative research projects. Funding is another area that the IT industry was found to provide. Some companies are proactive in supporting promotional programs like hi-tech project designs used in conducting regional and local student competitions. Administrators reported that many of these activities are being run with IT firms. For one of the universities, IBM developed a program in service science management and engineering. This program addresses providing specific science training skills. This IBM sponsored program helps students acquire the kind of employable skills that addresses a specific need for IBM.

The existence of industry advisory boards was a resource highlighted by administrators. In the literature research, a disconnect existed between the type of training offered to graduating students and what the IT industry expected to get (Hoffman, 2003). IT Industry collaboration with universities was recognized as a positive step in bridging the training skills gap. As the skills gap gets smaller, the employability of IT/IS graduates is expected to get better. An administrator said this:

We have worked with the IT Industry to try and understand what they want in our graduates. We have a Technology Board of companies that regularly meets with faculty to discuss what skill sets they are looking for in new hires. We have learned that whereas IT hiring firms used to hire students with no 'practical skills', they are now focusing on those with practical skills or experience. This relationship has helped us to revamp the curriculum. (Anonymous, personal communication, January, 2007)

Some universities invite the IT industry to give speeches to students, and some talk to high school students as well. “We also invite speakers from the IT industry to give speeches to students. They also help give an industry perspective to students about offshore outsourcing. The students can then realize that the situation is not as dire as portrayed” (Anonymous, personal communication, January, 2007). It is also important to note that whereas an administration’s industry involvement helped a revamping of the curriculum, in a stark contrast, another university took the opposite direction.

The association with the IT industry existed in the 1990s. However, after several industries closed or moved their operations to out of state (e.g. to Mexico, or the Midwestern U.S.), faculty became sort of passive. We had a big loss of industry and you have to travel long distances to visit companies, and the university does not pay for that. (Anonymous, personal communication, February, 2007)

It was observed that the association of universities with IT industry had varied interests and expectations. The communication and meetings are mainly formal, but also informal in other cases. Most universities hold regular meetings with the industry board, ranging from per semester to a 2-year interval. The needs and expectations from this interaction may be different for each university. The scheduled activities have an influence on what happens and when it happens for the planned meetings. There was a case where a university conducts regular surveys with area employers. The effectiveness of these associations will be varied as a result. The questions that arise out of this association include: How can these meetings be more effective? Should the interaction be formal or informal? Is there direct student participation, or is it a meeting between company chief executives (CIO), and other high level university delegates or faculty? Are there any defined objectives and goals for this association, or is it just a fulfillment of a requirement for accreditation?

Some of the notable contributions from the IT industry include: creating new and innovative training programs with financial support, help the development and design of a relevant curriculum that address the skills needed for graduating students or new hires, provide grants and scholarships, facilitate in creating competitive contests for example programming or design and development of new projects, IT Company executives providing speeches and lectures to students (high school and college), provide information debunking myths about offshore outsourcing, provide internship training for students, provide paid positions for student work, and recruit graduating students.

The Government Involvement

The U.S. government including state and federal governments have traditionally been partners with universities in education. In responding to the question of whether action has been taken to seek the U.S. government intervention on offshore outsourcing concerns, 23% said “Yes”. This intervention included a meeting with a congressional delegation. On the other hand, government intervention has been sought by 69% of the universities seeking increased financial support for science and engineering programs. This support is a direct attempt to increase student interest and enrolment in these programs. It also involves seeking funding to attract women and minorities. Some of the funding that was reported to have been secured include a grant of \$655,000, and the increase of student tuition grants from \$3,500 to \$10,000 per student.

As part of these interventions, administrators improved the flow of information for existing support in grants and scholarships to students and career guidance councilors. Some of the grants have strict conditions, for example a state fund that required the beneficiaries to work within the State after graduation. There was evidence that even with

grants being made available or increased, there was still difficulty utilizing the grants, because there was not enough qualified applicants. Some of the programs sponsored by government have names such as: STEM (Science Technology Engineering and Math) funds, global challenge, CEMES (computer engineering math engineering scholarship) scholarship, awareness campaign to attract high school students, and workforce development program.

Professional Organizations' Involvement

Eighty five percent (85%) of administrators belonged to a professional organization that has engaged in discussions or activities addressing offshore outsourcing. Among these professional organizations they include: Institute of Electrical and Electronics Engineers (IEEE), Association for Computing Machinery (ACM), Association of Information Systems (AIS), Association of Information Technology Professionals (AITP), International Association for Computer Information Systems (IACIS) and the Dutch Engineering Association.

The IEEE and ACM were noted for extensive work on offshore outsourcing issues. These include congressional hearings on capital hill. Several IEEE papers are quoted in the literature review (see chapter two of this report). The ACM working with other institutions has developed curriculum guidelines for universities. The ACM developed a brochure promoting IT/IS careers for prospective students (<http://computingcareers.acm.org/>).

Administrators with No Offshoring Concerns

Reduced Enrolments, Not Offshoring

Fifty four percent (54%) of the administrators that had no offshore concerns acknowledged having had questions from students/parents about offshore outsourcing. The responses given during this inquiry included providing information about careers that are less susceptible to offshore outsourcing. Discussions or changes have been made to re-design the curriculum by some of these universities. An administrator reported that:

Students and parents have come to ask me about offshore outsourcing implications. We have addressed the cases individually and encouraged them that IT/IS is still good. We tell them that IT/IS jobs are available for graduating students. We have also responded by making changes in the curriculum; emphasizing new fields like computer security, ecommerce, software project management and information assurance. (Anonymous, personal communication, January, 2007)

Offshore outsourcing is following the path of what happened in U.S. manufacturing more than a decade ago (Ferguson, Kussmaul, McCracken & Robbert, 2004). There is the perception that a mirror image is occurring, but in this case with IT/IS job positions. This phenomenon creates the need for a joint effort between administrators and the IT industry to determine what training is needed for IT people in the field.

Some administrators suggested that the expression of getting worried or concerned about offshore outsourcing does not describe the issues at hand, the focus needs to be on how to deal with the problem. “Whereas low level programming jobs like java, C++ and technical support jobs are outsourced offshore, this phenomenon creates new job opportunities, like managing offshore software development projects” (Anonymous, personal communication, January, 2007).

Innovation has been the heart and soul of the U.S. global lead in high-tech. Administrators stated that the continued production of new software or hardware services and products will drive the economy into the future. The student curriculum needed to be adjusted to fit the new emerging jobs in technology, which are less prone to offshore outsourcing. There was a general view from administrators that IT/IS jobs exist that are less prone to offshoring. There was evidence suggesting that training emphasis is given to offshore-proof career training, or new job types created as a result of offshoring; for example communication in an international context, global work teams and managerial skills. An administrator had the following comments:

The public makes offshore outsourcing appear to be a bigger problem than it really is. This information exchange discourages new students from pursuing training in IT/IS careers. Whereas some low paying jobs are outsourced offshore, new ones are getting created. (Anonymous, personal communication, January, 2007)

Other Influences for Reduced Enrolment

Administrators reiterated that offshore outsourcing is not the only probable cause that has influenced the lowered student enrolment numbers. There was the famous technology boom, which created a buzz in the 1990s. The internet had the reputation of making instant millionaires, and graduates of IT/IS careers prospered with irresistible force. Enrolments in the IT/IS programs saw their record numbers during that time. The Y2K problem generated another storm of needed IT/IS professionals. Companies hired many IT/IS professionals in preparation for the Y2K problem. After the year 2000 was in the history realm, some layoffs ensued creating a surplus of IT/IS professionals. Then the technology bubble burst and corresponding layoffs followed. One administrator stated that: “There was an over-training of individuals in the 1990’s, during the technology

boom. When the dotcom bubble burst, it resulted in a lot of people losing jobs. This created excess talent which has consequently influenced student enrolments”

(Anonymous, personal communication, February, 2007).

If jobs being available is a cause for attracting students, consequently the reduction of active IT/IS employees within the profession caused by these events may also be a factor. When students perceive that the jobs being offered to IT/IS graduates are less than those needed, then less students will enroll into these programs. That response gets reflected to the administrators in reduced enrolment numbers. It is then incumbent upon the administrators to consider the creation of new programs so as to attract more students. The designed new programs would have better employment possibilities for graduates.

There was a reported competition from other college programs, specifically accounting and marketing. The same student pool that recruit students in IT/IS programs is shared by other majors. This competition has been there before, and if students cannot go into an IT/IS program, they get attracted to what they perceive to be a “better” alternative. It may also be a case of improved image or better marketing by alternative programs. Or it is more likely that marketing and accounting jobs are more readily available and offer better remuneration. In a similar perspective, competition from new and burgeoning online universities was a reported cause that grabs prospective students. Instead of attending a brick and mortar and traditionally established university, the students get admission in online degree programs.

A lack of relevance in the current curriculum was proposed as another cause for reduced student enrolments. The curriculum designed ten years ago, and tailored to

conditions of the high-tech boom may no longer be relevant today. The system of curriculum design, development and implementation follows a number of processes. Accreditation requirements impose certain constraints on the student curriculum. Faculty unions may exercise certain requirements be met in new curriculum designs.

There is a perceived lack of knowledge on what a computer science career is. Associating computer science with learning about computers or knowing programming is inaccurate, especially in an era where computers are ubiquitous. Delineating what a computer science career is and what it is not may be part of the needed solution. An administrator said this:

Computers have lost their “mystique” because new students think that they know a lot about computers after graduating from high school. It has become an appliance or commodity. Whereas 80% of starting students finish a computer science degree, only 20% complete the computer information system degree at graduation. (Anonymous, personal communication, January, 2007)

For the U.S. IT/IS training to succeed, change needs to be embraced with grace. It is more likely for individuals to resist change. It is even harder to embrace it in academia, and more especially when it comes with a cost factor combined with limited resources. The U.S. has been sustained through innovation. Staying the course on the path of innovation is one of the main remedies to the IT/IS education. The end of an era marks the beginning of a new one. The era of nearly all IT/IS jobs staying in the U.S. was ended, a new era of IT/IS offshore outsourcing is going on. Offshore outsourcing creates a platform for new opportunities for administrators ready to pursue them.

Efforts to Increase Student Interest and Enrollment

Some of the interventions used by administrators that have no concerns on offshore outsourcing include: soliciting for funding from government to support science

and education training, holding campaigns in high schools, holding competitions like marathon of the mind contest, student advising, modifying the student curriculum, demystifying (or provide more information to students) computer science career opportunities. Some universities (29%) experienced information system majors having a greater decline in enrolment numbers than computer science.

Select Direct Comments from Administrators

The following section is a reflection on some of the individual administrators' views on offshore outsourcing, and its influences to the IT/IS education system:

Administrators with offshoring concerns:

- Offshore outsourcing poses a challenge, but there is still excellent long-term prospects for someone who wants to work in IT in the US.
- I have a negative attitude about offshore outsourcing. I have worked in the software industry and have seen the negative influences of offshoring. Our students read about it online they hear reports in media and many no longer want to pursue IT/IS training.
- There is more IT employment now than there was at the height of the dotcom boom, but today's jobs don't have the attractive get rich quick aura. In the medium term, as shortages of qualified workers appear and salaries go up, there will be more students in IT majors, but this will take time.
- Companies that opt to outsource offshore are short-sighted.
- The standard of the low level IT jobs that are taken offshore keeps going higher and higher in available offshore skills and sophistication.

- Offshore outsourcing is targeting “encyclopedic” work or help desk type jobs. These jobs are for care and feeding the operating IT network.
- Offshore outsourcing causes students to perceive there will be fewer jobs available for them. Fewer students will pursue a career in IT/IS programs.
- Offshore outsourcing enhances competition. Its effect on higher education is a perception and not a reality.
- We operate in a free market system where offshore outsourcing is another product of this system.
- The University is emphasizing internationalism in the curriculum, and how to be an effective team member in a global work environment. This has changed the way we teach. We have developed training modules on language and cultural differences. The students need to have a passion for their career in order to succeed. There are many niches in IT/IS that students can get themselves in, and I should not stand in the way of their career choice.
- Offshore outsourcing sends a confusing signal to the IT/IS educational system affecting both local and international students. There is a need to adopt a coherent national strategy on offshore outsourcing, as it relates to development of a U.S workforce in IT/IS. Should the federal government create H1B visa slots of up to 500,000? Such legislation would impact the U.S. workforce, and requires a close scrutiny. The shortage is not in the job positions for DBAs, programmers or network administrators, but the shortage of paying a \$30,000 salary compared to a \$70,000 salary. A balanced strategy

for hiring outside nationals, and also developing an internal and sustained capacity of U.S. workers is needed.

- It is natural to become part of the global economy. We cannot fight this new reality. We cannot put up laws to prevent one country from hiring people from other countries.

Administrators without offshoring concerns:

- The curriculum for our students needs to be adjusted to fit the new emerging jobs in technology, which are less prone to offshore outsourcing. Students need training in communication skills, managerial skills and project management. Students need to be trained in the new skills created by innovation. They also need to develop the ability to learn by themselves. What students learn in school today is no longer a promise for a job for life. They need to upgrade their training skills probably every 5 to 10 years time.
- Enrolment in IT/IS training follows the stock market trends. However, there is a 2 to 3 year delay period between when the stock market rises or falls. After the delay, the corresponding change in numbers for students graduating to enter the job market occurs. This delay exists because on average students take 4 to 5 years to graduate from college.
- Those companies that are innovative, and also possess intelligent individuals (or young entrepreneurs), who are adept at creating new technologies will thrive and survive. These types of companies will create new job opportunities. Today we have YouTube, Yahoo, Goggle and people of like minds that are good examples. The get rich quick days of the dotcom era is

gone, and people need to appreciate and learn that it is with hard work and creative minds that sustainable wealth can be created.

- New technologies should promote a safer world environment where new products can last longer and are re-cyclable, instead of being dumped anywhere in the world, which creates pollution. These are areas where innovation and technology development can create a better earth environment for all humans on the globe. This will also create job opportunities for our graduates.
- We have special days in a semester whereby we make telephone calls to students admitted to a CIS major and address any questions. We also have articles and pamphlets on computer science to promote the program. We make a differentiation of what our program is and what it is not.
- I have heard media talk about it and read it in newspapers that offshore outsourcing is increasing. Otherwise I have no view about it.
- If we cannot compete with overseas nations, then we are going to have to adjust.
- Eventually jobs will get done in any country where it is most cost effective for the job to get done, like what happened in U.S. manufacturing. It might be medical outsourcing, or IT/IS outsourcing. This increases the need for competitiveness of graduates from U.S. colleges. It also exerts pressure on the educational system to produce better skilled graduates.

Shared Comments on Offshoring

Whereas administrators without concerns for offshore outsourcing were 35% compared to those with concerns (65%), there was a significant number of common issues; They experienced reduced enrolments (averaging 71% overall), Innovation was presented as the key for maintaining U.S. competitiveness in the global market, Trade globalization is a strong contributor to offshore outsourcing, Offshoring is part of the free market economic system, There is a need to strengthen student training in offshore-proof job skills, The dotcom bubble bursting was a significant factor (50% of administrators shared this view, see Figure 13) to reduced student enrolments. The general theme from administrators with and without concerns suggests that reduced student enrolments require some action to reverse the trend. A disparity emerged on which of the two main causes for reduced student enrolments is most significant; is it the technology bubble bursting, or offshore outsourcing that has the greater role? When the 20 administrators are displayed in a Venn diagram (see Figure 13), 40% attribute enrolment declines on offshoring, 50% assign it to both offshoring and the dotcom bubble bursting, and 10% to the dotcom bubble bursting.

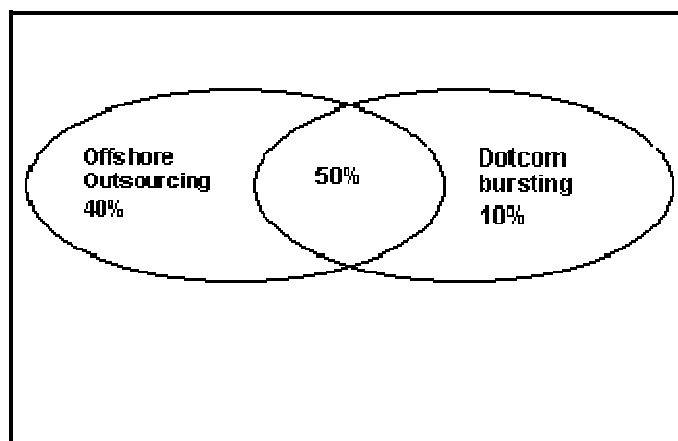


Figure 13. Cause of Enrolment Declines, Offshoring or Dotcom Burst?

Evidence suggests that jobs are available for graduates in IT/IS careers. The average employment rate for sixteen universities was 93%, four universities did not provide student employment rates of graduates. The national unemployment rate for ages 20 to 24 for December 2006, was 7.9%, for age group 20-24 (Bureau of Labor Statistics, 2007a). In comparison, the average unemployment rate of graduating IT/IS students for universities in this study is 7%. This is better than the national unemployment rate of 7.9%. This implies that IT/IS graduates are doing better nationally in getting jobs.

Table 6. Employment Prospects for IT/IS

Numbers are in thousands		Employment '000		Employment Change 2004-14				Percent employed in 2004	Job Openings due to Growth			
CODE	TITLE	2004	2014	Number	Rank	Number	Rank		Number	Rank	Salary	Unemployment Rate
15-1000	Computer Specialists	3,046	4,003	957	?	31.4%	?	4.3%	365	?		
15-1011	Computer and Information scientists research	22	28	6	VL	25.6%	VH	5.1%	28	VL	\$85,190	L
15-1021	Computer programmers	455	464	9	VL	2.0%	VL	4.5%	28	VL	\$62,890	H
15-1030	Computer software engineers	800	1,169	369		46.1%	?	2.4%	91	?	??	
15-1031	Computer software engineers, applications	460	682	222	VH	48.4%	VH	2.4%	54	L	\$74,980	L
15-1032	Computer software engineers, systems software	340	486	146	H	43.0%	VH	2.4%	37	L	\$79,740	L
15-1041	Computer Support Specialists	518	638	119	H	23.0%	VH	0.9%	87	L	\$40,430	H
15-1051	Computer Systems Analysts	487	640	153	H	31.4%	VH	5.0%	56	L	\$66,460	L
15-1061	Database administrators	104	144	40	L	38.2%	VH	0.5%	9	VL	\$60,650	L
15-1071	Network and computer systems administrators	278	385	107	H	38.4%	VH	0.6%	34	L	\$58,190	L
15-1081	Network systems and data communications analysts	231	357	126	H	54.6%	VH	19.9%	43	L	\$60,600	H

Symbols: VH-Very high; H-High; L-Low, VL-Very Low. Source: Bureau of Labor Statistics (2007b) p.48. Used with permission.

The Bureau of Labor Statistics shows a projection of employment for the IT/IS U.S. job market from 2004 to 2014 (see Table 6). The IT/IS employment career is represented in 11 job categories. The employment rates for 2004 was rated as follows: “very high” or “high” for six categories, “low” or “very low” for 3 categories namely; computer and information scientists for research, computer programmers, and database administrators. After ten years in 2014 (projected from 2004), the projected employment ranking for eight categories is “very high” for all categories except one (expected to increase ranging from 23.0% to 54.6%). One category is rated “very low”, that is for computer programmers. Two categories have no ranking for the year 2014. These figures suggest that programming is expected to be the worst performing sector in jobs compared to the others. Some administrators reiterated this view.

The Passion for IT/IS Careers

There was an perspective that IT/IS jobs available for fresh graduates today are like a moving sniper target located on a dynamically changing platform. This fictional observation can help the passionate and IT/IS enthusiasts effectively manage the scene for the target practice. The type of jobs available for IT/IS careers are rapidly changing. Even consulting job positions for faculty were reported to have changed. Educators and students need to be positioned such that they can circumvent the gauntlet for IT/IS careers. This means that they need the ability to cease the moment, explore the available opportunities and maximize the potential to take advantage of new innovative technology adventures lying on the horizon. Hi-Tech companies make a concerted effort to identify the next big thing, they then fiercely compete to get it out quickly to the customers. The

early free market adopters for the next big thing are the greatest beneficiaries as the race towards capturing the critical mass takes place (Peters, 1999). The intrinsic survival rule operates such that the best and brightest can survive the IT/IS gauntlet by moving faster in the right direction of opportunity. Friedman (2005) quotes Louis Pasteur who said that: “Fortune favors the prepared mind.” One administrator in this study said that: “We have the opportunity to focus our curriculum offerings in areas that require outside of the box thinking, national security issues, and emerging applications requiring strict confidentiality” (Anonymous, personal communication, January, 2007).

Offshore-Proof Value Added Jobs

There are IT/IS work activities that require close proximity and interaction with the customers on a particular service or product. Some of these include systems analysis of front end processes, testing and local system troubleshooting. Sensitive data or information that raise significant privacy and security concerns may not be offshored. Expressed in the words of one of the respondents: “There are many niches in IT/IS that students can get themselves in and I should not stand in the way of their career choice” (Anonymous, personal communication, January, 2007).

The Mistaken Cause

The perception by students or advisors that there will be no IT/IS jobs in the future is a mistaken cause. This pessimistic information is easily propagated among students, and the fallout on this trend can become “a self-fulfilling prophesy”. At the extreme, lowered student enrolment produces an insufficient number of graduates for

hire. This would consequently cause hiring IT firms to look elsewhere (or overseas). As more jobs get moved offshore, and the message goes around of increased overseas hiring, the number of students coming into IT/IS programs could grow even smaller, and the need for offshore hiring would increase. When this cycle repeats itself over and over again, the self fulfilling prophecy feeds itself into a worst case scenario of a dangerously low number of IT/IS graduates being generated within the U.S. economy.

Here below are some myths the researcher postulates from the study results

1. All IT/IS jobs are going offshore
2. Offshore outsourcing will come to an end
3. Offshore outsourcing only targets low end technology jobs, or help desk jobs
4. Offshore outsourcing is bad for the U.S. economy

The News Media Catalyst

The news media has had a significant cause in creating the euphoria “of a student enrolment crisis in America” (Anonymous, personal communication, February, 2007). The fairness of reporting from news media was mentioned to be lacking. Whereas a problem is created due to the loss of jobs to overseas nations, the media publicity was expressed to be blown out of proportion. The talk of there will be no future IT/IS jobs in the U.S. was said to be inaccurate. The flow of international students into college programs in the U.S. continues. There are some students that come and go back to their countries after graduation. There are also those students that stay after getting jobs locally.

Rebuttal and the Quiet Crisis

The argument of sophisticated work not being outsourced offshore does not substantially help fresh college graduates. It is not expected that fresh graduates from college get hired for advanced work – except for some research. This argument is relevant for experienced IT/IS employees (Davis, Gorgone, Couger, Feinstein, & Longenecker, 1997).

It is true that there is no crisis expected in the near future caused by jobs being lost to overseas nations. The “sky” will “not fall” in a few years time. However, Friedman (2005) refers to the diminished view of the new challenges as the “Quiet crisis”. He calls on the US to roll up the sleeves, be ready to compete and keep investing in the “American Sauce”. “And this quiet crisis involves the steady erosion of America’s scientific and engineering base, which has always been the source of American innovation and our rising standard of living”. Friedman quotes Dr. Jackson “The U.S. today is in a truly global environment, and those competitor countries are not only wide awake, they are running a marathon while we are running sprints” (p. 253).

If the “quiet crisis” runs its full course un-impeded, it is then that America will expect an awakening when the major crisis is finally yielded. This will occur when a critical shortage of innovative engineers and scientists will be realized. The current un-developed countries will be on top of the global economy, and also leading in the hi-tech design and developments of the century.

Reported Positive Results

ACTIVITY	Measured by
Increased interventions for freshmen and current students	Reduced attrition rate by 15%
Competitions and creating hi-tech project designs	Enrolments reversed from declines to > 100%
A campaign to attract under-represented groups	Reported to be successful
Soliciting for grants from the state government	Reported to be successful

Available Job Positions and Firms Hiring

- Systems analysis, information systems work at the application level, numerical process control
- System / Network administration, and web design
- Networking, multimedia, web programming, and database management
- Students start their own businesses, some provide help desk support
- Software engineering and general software design and development
- Software Analyst, Network Analyst, C++ coder, Java coder, ASP coder
- Hiring companies reported include: Sun Microsystems, Microsoft, HP, Raytheon IBM, Dell, Siemens, Motorola The Army, Navy, and financial services firms

A one page snap shot view of what administrators said in this study is shown in

Figure 14.

<u>Student Enrolment Issues</u>	<u>Specific Actions</u>	<u>Consequences</u>
1. Proliferation of Technology gizmos 2. The Dotcom burst 3. Lack of Hi-Tech Buzz / lost hi-tech mystique 4. The myth of "we know the technology" 5. Negative media talk 6. Offshore outsourcing activity	1. Conduct high/middle school seminars 2. Hold technology competitions 3. Provide funding / grants 4. Offer student counseling 5. Solicit minorities / women 6. Run promotional summer programs 7. Hold special computer science days 8. Conduct quiz with prizes 9. Hold functions like debates 10. Invite IT industry speakers to talk about the IT job marketplace 11. Advertisement TV/ other Media / website 12. Develop promotional pamphlets and brochures 13. Attract the millennium generation - myspace.com 14. Improve retention through tutoring 15. Inform and notify freshmen on IT careers including student advisors 16. Redesign / review of the curriculum 17. Provide information / advising on offshoring 18. Conduct mandatory internships or co-ops (work for pay) / capstone experience 19. Implement / institute industry advisory boards 20. Hold internship in offshore countries 21. Training on cultures and languages 22. Apply for government support	1. Reduced student enrolment 2. Types of available jobs has changed for graduates 3. Reduced IT/IS Majors 4. Internships started in offshore countries 5. Student marketing techniques have been changed 6. New sponsorship programs initiated 7. More Government help 8. Engage IT Industry 9. Engage Professional organizations
<u>Proposed/New Courses</u> 1. Information security 2. Computer security 3. Computer games 4. Information assurance 5. Bio-informatics 6. Ecommerce 7. Software project management 8. Managing offshore software development 9. System integration 10. Software acquisition		<u>Other Causes for Low Student Enrolment</u> 1. Low public perception science and technology 2. Lack of incentives/ motivation for minorities and women 3. Technology advances increase productivity 4. Shortage of skills by school graduates 5. Increased marketing competition from non-IT majors 6. High competition from online degree training 7. Y2K problem that created an excess workforce 8. IT/IS image of nerds and anti-social male individuals 9. Mis-information on job availability in IT/IS careers 10. Failure of educators to adapt the training to current opportunities 11. Resistance to change in academia
<u>Offshoring Concerns</u> 1. Reduced student interest /enrolment in IT/IS Programs 2. Reduced competitiveness of the U.S. IT/IS workers 3. Data security / privacy threat, Intellectual property issues 4. Training standards require change in order to remain competitive 5. U.S. Students need to adapt, and be agile 6. Reduced local U.S. job opportunities 7. The glory of an IT career is lost! 8. Drop in IT/IS salaries		

Figure 14. A Snapshot of Perspectives.

Summary

The study involved twenty universities, having student populations of 5,000 to nearly 50,000. The average student population for the 20 universities was 16,751. Four of these universities are ranked by the Princeton review as being among the best 100 in the U.S. The majority (65%) of administrators had concerns for offshore outsourcing. They perceived offshoring as being a cause for reduced student enrolments in IT/IS college programs. The minority (35%) of administrators without offshoring concerns, all except one reported reduced student enrolments ranging from 40% to 75%. Therefore 95% of all universities in this study reported reduced student enrolments between the academic years 2000/2001 to 2005/2006.

Administrators enumerated advantages of offshore outsourcing like, labor cost savings, getting overseas talent, affordability of premier services to smaller companies, it fuels innovation, gives companies more flexibility, plus more. The administrators enumerated many disadvantages of offshoring that include: reduced IT/IS job positions in the U.S., the lowered interest of students to enroll in IT/IS programs, declining graduation rates, reduced morale for IT/IS workers, introduction of security vulnerabilities, and unstable foreign country dependency among others.

The marketing strategy for IT/IS career training has been modified by many universities. Outreach programs have been designed and implemented for high school, k-12 and middle school students. The targeting of potential students includes; visiting high schools, presenting lectures, conducting regional and local competitions, the implementation of summer programs, and solicitation for funding. Another reported strategy was targeting special groups like women and minorities. Universities have come

up with programs, courses and majors that hold the promise of offshore-proof skills training.

Sixty two percent (62%) of the administrators that had concerns for offshore outsourcing implemented changes in student programs to specifically address offshore outsourcing influences. Internships are sponsored for U.S. students to go and work with offshore vendors overseas. Collaboration of IT/IS programs with other departments is another action taken to increase student enrolment. Departments reported in this collaboration include management, accounting and biology. A number of universities have IT industry collaboration arrangements. The IT industry has provided research funding, curriculum advice, hiring graduates and offering internships, among other things.

U.S. government involvement has been sought to increase student enrolment and interest. Some of the help includes provision of grants, or support for campaigns in science and engineering programs. Professional organizations were reported to be involved in addressing issues of offshoring and student enrolment. Other factors were highlighted as probable causes to declines in student numbers, for example, Y2K, the dotcom burst, and media sensation. The competition with online degree programs, irrelevant (outdated) curriculums, and resistance to change by faculty unions were reported causes for lowered student enrolments. It was recognized that the employment rate for IT/IS graduates was better than the national average based on the unemployment rate (using the estimate from the Bureau of Labor Statistics). The mission for administrators is therefore creating and implementing policies that attract new students into IT/IS degree programs. The next chapter discusses the conclusions on this study.

Chapter 5

Conclusion, Implications, Recommendations, and Summary

Chapter five gives an overview of all the other chapters. It provides the study conclusions, implications and recommendations. It discusses a working IT/IS educational system using words and expressions based on the metaphor of a luxury cruise ship on voyage. The system is expressed to comprise of role players; IT/IS college administrators, government, IT industry, professional organizations, students, and media. A call is made for combined efforts in a constructive and supportive alignment to address the issues on increasing student interest/enrolment in IT/IS programs.

In the following sections, additional words and expressions will be used to explain the researcher's findings; like "uncle Sam" an expression used when referring to the U.S. government, its power, money, and authority. This is used because Neuman (2003a) wrote that qualitative research follows an inductive approach as opposed to a deductive approach, which is used in quantitative techniques. Neuman suggests that the qualitative approach deals with soft data impressions, like words, sentences, photos and symbols. The qualitative researcher therefore uses a transcendent perspective speaking the language of contexts and cases. Qualitative research presents authentic interpretations sensitive to specific social historical contexts, and also applies logic in practice in contrast to reconstructed logic. Among the words and symbols used in this chapter

include ship, ocean and more. Their purpose is to help give a better understanding of the researcher's arguments, views and interpretation of the study results. The main image used to support the researcher's interpretations, explanations, and recommendations uses a ship on voyage, as a representation for the working of the U.S. IT/IS educational system. To the reader of this document, this is part of the researcher's innovation (or thinking outside of the box) using this approach.

Conclusion

This study was formulated on three research questions:

- 1) What are the concerns in U.S. universities due to IT/IS offshore outsourcing, in relation to interest and enrolment by students in IT/IS programs?
- 2) What are the prevailing consequences of IT/IS offshore outsourcing on undergraduate training for IT/IS programs?
- and 3) What are the specific changes in IT/IS university programs that can be attributed to IT/IS offshore outsourcing?

With respect to the first research question, there are twelve separate items that emerge from chapter four: a) influence on student interest in IT/IS, b) the U.S. IT/IS worker morale, c) data security and intellectual property protection, d) training in new skills, e) the need for innovation and be on top of the competition, f) undue attention to the problem, g) government role through regulation, funding and H1B visa policies, h) remuneration in IT/IS careers, i) the image of IT/IS careers, j) IT industry, k) role of professional organizations, and l) media.

These issues touch on several entities; the IT/IS educators, students, working IT professionals, IT employers, government and the news media. This suggests that it is not

a single entity-type problem that can have a single organization's solution. Each of these groups of people have a role to play, and yet none has the leverage to win the fight single handedly. They each have individual responsibilities, and yet a concerted effort is required to coordinate a combined attack on problems that need to be overcome. The separate efforts need to reinforce one another. It is through coordination or oversight, and the definition of clear objectives, goals and working strategies that will enable this kind of constructive and positive behavior.

With regard to the next research question, at least the problem has been recognized: whether it is caused by offshore outsourcing or the dotcom burst, the final consequences are the same. Some of the responses to this question included; Implementing curriculum reviews or discussions on developing a relevant curriculum, redefining departmental marketing strategies and goals for new students, and also seeking IT industry advice or help. Student advising has taken on a new dimension and approach. Activities to improve and promote the image of IT/IS career training have been created. Administrators have looked at new ways to prepare students for work. They have considered emphasizing training in areas that are perceived to be "offshore proof".

As for the third research question, universities have designed new student training programs including information security, training in management of offshore businesses, or distributed global workers. There was a declaration for dropped course training, specifically some programming courses. These are courses perceived to be prone to offshore outsourcing. Some universities have introduced internationalism in the curriculum, language and cultural differences are course components in this one! Could this be a surprise? This brings up a note of an old adage; "If you cannot beat your enemy

join them”. The researcher chooses to add, if they are not a suicidal group, please join them. In one of the universities, an online degree program was introduced. If the U.S. imagines that there are many online degree schools, a traditional brick and mortar university has recently considered introducing one! One of the most striking statements in this research was: “If we have no students, then we have no department”. It is neither “a wait and see approach” being portrayed here, nor is it “what caused the student declines” question. Instead, it is a decisive and proactive call to arms, it is an offensive attack on the “destructive clones of offshore outsourcing”. This was accomplished in measures that only ensured the enrolment numbers were going up from the year 2004. The year is important here, because most universities are not sure a bottom of declining student numbers has been hit! This statement came from an administrator who was one of only two universities that had enrolments above 100% compared to those of the year 2000 levels (one with <10,000 student population and another one with just over 16,000). That translates into, well, the dotcom or offshore outsourcing was only a means to innovate the marketing of IT/IS career training. For this particular university, it has not been able to satisfy the hiring demand of the area IT/IS firms. A number of universities suggested an inability to satisfy the IT firms’ hiring needs, but at a reduced enrolment and lower graduation numbers, that may be the primary reason (see Figure 12). The IT/IS graduating students are experienced hiring rates of 90% and above, for most universities (or 65%). However, this should not suggest complacency towards a proactive role playing in marshalling troops for an offensive to increase student numbers in IT/IS programs. The marketing of IT/IS programs, together with coalition forces of the willing, is needed to address problems in the IT/IS academic community.

Here below is a summary of advantages and disadvantages of offshore outsourcing, and as seen from the perspective of IT/IS college administrators.

Advantages of Offshore Outsourcing

Below is what IT/IS administrators identified as advantages:

- Offshore outsourcing encourages innovation
- Provides an economic advantage of reduced labor costs
- Helps economies where jobs are offshored
- Offloads long term liability, like retirement benefits
- It creates flexibility for IT companies
- Outsourcing creates expanded markets in IT/IS services for U.S. companies engaged in this trend.
- Globalization creates a need for interdependency among nations
- Small companies can buy services that they could not afford otherwise
- Offshore outsourcing makes IT a variable and not a fixed expenditure
- Provides access to available talent in offshore nations

Disadvantages of Offshore Outsourcing

Here below is what IT/IS administrators identified as disadvantages:

- Reduced IT/IS job positions in the U.S.
- Reduced product quality may come to the market. The quality of service on overseas operations may not be as good as local onshore services
- It is a challenge to intellectual property, security, confidentiality and violation of privacy

- The U.S. has to spend more energy and innovate to create new IT jobs
- Some individuals lose jobs with no equal or better job alternatives
- Offshore outsourcing increases managerial overhead costs
- The threat of a consumer economic backlash is a likely outcome
- Creates a foreign country dependency problem with instability shortfalls
- Communication problems, time zone differences and language barriers
- Difficulty in integrating complex projects
- The turn around time for new product development may be increased

Need for Campaigns to Increase Enrolment Numbers







This campaign has six groups of people, it is like they are all traveling in one ship. These people are; current college students or prospective students from high or secondary schools, the job market creators or IT/IS employers, the IT/IS administrators under which are college faculty, IT industry, media, and government. The six groups (or entities, voyagers, or role players) need to hold a continuous dialogue amongst each other, exchange ideas, draw up plans and manage the ship's navigation with one final destination in mind. The research results have shown some of the workings of these groups, for example getting students to participate in internships with the IT industry, arrange co-ops with work for pay (how would a student avoid that pay check, especially when they may be broke 4 out of 7 days!). This payment has a positive influence, it means there is work for pay, even while at school. Under this paid work activity, the student may ask; "What jobs does the news media say are going offshore"? This act would therefore provide ammunition for refuting negative media reporting. The thinking will be like; offshored jobs are those new ones created offshore by the student's

employer! How great is that for an image enhancer to an IT/IS student seeking this career? With this going on, a multi-pronged approach is being advocated for in this document. It also means, that faculty should not only enjoy fun on the deck watching sea birds, but also multi-task working on those niches that excite the innovation engine. Following the interview transcript words, innovation was one of the most popular words. Thinking out of the box is another term that featured in the discussions. The study identified new areas of training; bio-informatics, nano-technology, double majors or minors like forensic technology, security, data mining and many more. A new campaign selling IT/IS career training is needed.

The buzz that goes with the next killer application or techno-gadget, is what the IT industry cherishes. Support needs to be sought from industry and government in the areas of research and development. The latest and cool technology toy may stay on the store shelf if it is not marketed! There are lessons to be learned here, concerning how businesses work and promote their products. They use marketing, which may be through television, newsprint, online and not least at the super-bowl commercials! One administrator reported to have used television advertising. Why shouldn't other universities employ this technique? The online universities competing for the same student base uses television advertising. This media has not hurt the business industry, why should universities not benefit by employing this media to advertise their programs? If the problem is media mis-representation or negative reporting, the politicians do a better job of fighting back at the opponent with the same tool! Nuclear weapons are believed to be a deterrent for war for the same reason. If the enemy develops the weapon, the best advice is that you also develop a similar one, then the mayhem might never

happen at all! The workings of the system or the voyage towards IT/IS educational emancipation will take the form depicted in Figure 15. The symbolism in Figure 15 is explained in Table 7.

Table 7. Symbols of IT/IS Educational Working System

§	The Federal/State government holds the greatest financial power, besides the political influence to make things happen
	Information flow and availability is very important to all players in the student enrolment improvement struggle
	It is about people, ladies and gentlemen, it is “a no gender or ethnic group left behind” type of approach that should be embraced
	Should the IT/IS administrators use their intellect to make IT firms withdraw from the offshoring trend?
	To ensure a comfortable information security regime and intellectual property safeguards that are known to work for the U.S., there may be a danger lurking out there overseas
	The financial benefit poor nations gain by providing offshore services can be regarded as help, except it is of a kind that goes with work
	It can be dangerous for the U.S. firms to offshore those elements of their businesses that give them the competitive advantage. The crown jewels of IT business may be too risky to be transferred across the Atlantic.

The system represents the different entities (or organizations) involved in this process; IT/IS educators, college / high school students, the IT industry who hire students from universities, State and/or Federal government, professional organizations, and media. Arrows show the kind of communications or dialog that is expected to be happening. The central players (nerve center) are the IT/IS administrators (or educators); they have the greatest responsibility in the whole process. Most activities on Figure 15

originate and feed into the nerve center (central players). The captain of the ship is an Innovation Technology Architect (see Appendix K, for a description).

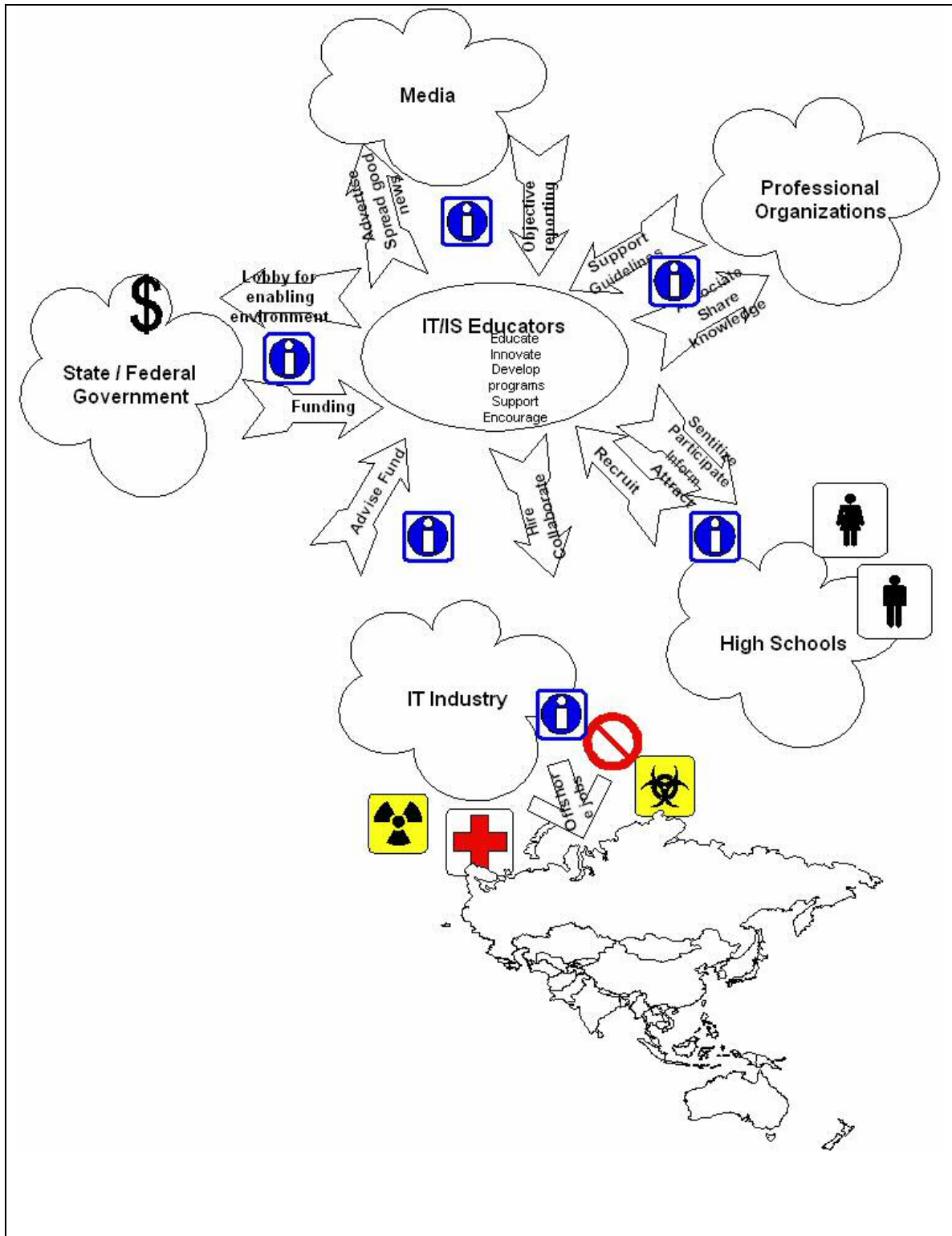


Figure 15. The Working IT/IS Education System

The IT/IS administrator has been steering the ship; it is a majestic ship in the rank and file of The Titanic or The Queen Mary Two. The historical lesson to learn from the Titanic however, is that majesty, the glitz and glamour, like one that existed in the dotcom era, can make the captain forget that a tip of an iceberg spells disaster, if its existence and dangers are ignored. The extreme case is being like a ship navigated under the Captain for Pirates of the Caribbean! For his passengers, the home port (or port of origin) is known by everyone onboard. The problem is that no one really knows their final destination, except the Captain and his closest confidants. Danger comes starring with furor, sudden death and destruction, and almost without warning! The chances of survival are probably worse than winning a lottery jackpot! As for the ship steered by an Innovation Technology Architect however, it is expected that VIP seats are reserved for those wishing to get on the voyage. The luxuries and amenities are provided, a helipad exists for passengers wishing to fly a 50-mile radius from the ship, and watch the ocean scenery from air and above the waters. Welcome aboard IT/IS Educators and administrators, here is your captain and ship of the future, and the ultimate survivor of this generation!

Role of IT Industry

If the IT industry does not take care of the hand that feeds it with intellectual capital, it might starve to extinction before any help comes along! The doomsday prediction comes from one of the administrators' comment: "The failure to recognize competitiveness as the next domineering force in a global economy, is likely to make negative concerns on offshore outsourcing a self-fulfilling prophesy". There is a perceived domino effect symbolized in this statement. If the shrinking of university

enrolment continues without recovery, the source of new hires, would shrink continually, and the final result can be that 95% or more, of a U.S. firms knowledge workers will be offshore nationalities, and living overseas. This is the case of the vendible line that goes all the way to the top, the U.S. local IT/IS departments in an enterprise would cease to exist (See Figure 5). If the top executive is what remains in the U.S., what are the chances for “a hostile take over” scenario? Who becomes dependent on whom? Doesn’t the 95% have the greater power and influence? Such a U.S. company could literally collapse and the new owner becomes the offshore company. The XYZ widget corporation may cease to exist in the U.S. Can this evolve into a national security issue, or even an economic threat, depending on how many companies fall prey to this predicament? The continued collaboration of IT industry with universities can help drive up the student interest. It can provide the reassurance for availability of careers in the future. This can be a powerful tool. It plays a numbing role to quell the nay-sayers or students who are nervous and unsure of what lies ahead for IT/IS careers. The reported participation of giving speeches, facilitating on IT/IS image building, and creating internship opportunities were positive interventions, whose effects reveal the good story.

Role of Government State / Federal

Whereas the role of government is not always conspicuous, its participation is not any less important. When discussing the entity-types (at the beginning of this chapter) under the list of concerns, it was emphasized that a concerted effort of all role players (or voyagers) is important for the success of the IT/IS image improvement process. This is about creating jobs for graduates, government is a big employer, and where army or defense institutions share physical locations with universities, their presence was credited

to be a valuable asset. Besides providing employment positions, government at the federal or state level, provides the all important platform of creating an enabling environment. This goes for both business and universities, and the global economic dynamics as well. An administrator suggested that: “A balanced strategy for hiring outside nationals, and also developing an internal and sustained capacity of U.S. workers is needed”.

In exercising the balanced strategy, Government plays the active role of a referee. IT business and firms pledge allegiance to their stockholders. One of the most fundamental rules that govern business decisions is the term “return on investment” (ROI) or building stockholders value. The bigger question is on how this compelling principal affects the other players (or voyagers) in the IT/IS Working System. The IT firms will consider the later question as a secondary or tertiary concern (with ROI being primary). The main driver to offshore outsourcing is cost savings to the IT firms engaged in this activity. This aspect is therefore the IT firms’ primary concern. Government has the power of the purse, to give money to universities and support IT/IS educational programs. It also has the power of limiting or stopping unfair business practices that undercut IT/IS educational programs. As a legislative affront, Government can make offshore outsourcing friendly legislation as provided in Appendix L.

Role of Professional Organizations

Eighty five percent (85%) of the administrators belonged to one of the following professional organizations; ACM, IEEE, International Association for Computer Information Systems (IACIS), Association of Information Systems (AIS), and Association of Information Systems Teaching Professionals (AISTP). These

organizations were reported to have discussed offshore outsourcing and its implications. In addition, certain approaches have been developed on how to improve student enrolments, for example, the ACM designed a brochure to attract women in computer science. The ACM has also developed curriculum guidelines. The IEEE-USA is advocating for fair technology laws, the payment of H1B visa workers comparable wages as for U.S. citizens, and the payment of fair wages to offshore workers overseas. The professional organizations provide strength behind numbers, they help give guidance, steer universities in a direction that has validity plus a certain level of unanimity, and intellectual capital. Some of these organizations play another beneficial role of a sandwich between teaching, research and practicing professionals (the triple-combo solution).

Success Stories

It was not a grim picture for all participating universities in this research. These universities are faced with the challenge of reviving student enrolment numbers. There are two universities that had very good numbers of enrolment, above 100% compared to their record highs. Unfortunately however, one of the university administrators could not provide an explanation for it. On the other hand, the second administrator knew the “magic” behind that stellar performance. A short summary of what this administrator had accomplished during his tenure follows here below:

The professor said that; “If we have no students, then we have no department”. “We have a proactive approach that courts more students into our IT/IS programs. We have implemented programs that give a great image to the IT/IS profession. These programs include competitions, and executing projects that design innovative systems.

These interventions have worked well to increase enrolment numbers for our classes”.

Some of the initiatives that were undertaken include:

- Send faculty to talk to high school students
- Make programming contests in high schools
- Get grants from government
- Perform favorably in regional project design competitions
- Institute an Industry Advisory Board

The administrator in this university had a relatively neutral attitude towards offshore outsourcing, and worked in industry where offshore outsourcing had been implemented.

General Comments

The focus in this section will be on two interesting comments from the interview results:

“When student numbers were at the record highs in 2000, we did not get a corresponding increase in faculty. Now that student numbers are low, our faculty can better handle the student load” (Anonymous, personal communication, January, 2007).

This argument is like let the market determine the dynamics of student enrolment numbers. This brings into perspective the law of demand and supply. In the trading of goods, the market forces determine a commodity’s price. When the demand is high, the price goes up, and when the demand is low, the price comes down. The focus here is on the new market dynamics of a global versus a national economy, but one in IT/IS career training. Do the same rules apply equally in a national as well as in the global IT/IS job economy? Doesn’t the participant or merchant need to look at what new opportunities are created? Determine who are the new competitors? What their strengths and weaknesses

are? Aren't these questions relevant in order to respond and maximize the potential for success, and strengthen the competitive advantage?

Another college administrator made this comment: "The shortage is not in the job positions for DBAs, programmers or network administrators, but the shortage of paying a \$30,000 salary compared to a \$70,000 salary. A balanced strategy for hiring outside nationals, and also developing an internal and sustained capacity of U.S. workers is needed".

The shortage of a \$30,000 salary can be met, but there is more to it than just a \$30,000 salary. The average college student with a student loan of \$70,000 to be paid in 10-years, is expected to repay the loan at \$777.14 per month. With a modest cost of living of \$1,500 per month, the graduate's financial needs go up to about \$2,300 per month or \$27,600 per year. A before tax income of \$30,000 reduces to about \$25,500 after taxes (calculated on an estimated 15% overall tax rate over the top of the salary, and for all federal, state and city taxes). This net income is short by about \$2,100 of the required amount for the fresh IT/IS worker to live on. Now, if jobs will be accepted at \$30,000, how are the IT/IS graduates going to financially survive in the workplace? Will they hold their jobs? What else must be done, to keep them from seeking a better paying career? Shouldn't the hiring firms take the responsibility of paying tuition for new hires? This could go along way in lowering a possible employee turn over for new hires. It is known that many corporations make tuition re-imbusement for employees upgrading their training skills. Shouldn't companies pursue this strategy paying under-graduate student loans and provide an incentive for the employability of local U.S. graduates? Student loan payment is practiced in some major cities for school teachers, and also by

the U.S. military. The other approach may be the reduction of tuition, which is now on record to have gone up far in excess of inflation over the last 20 years, Brian Williams, (personal communication, 2007). Universities have limited financial resources, else they have to pass on the burden to their main customers, the students.

Common Threads for Concerned and Unconcerned

Ninety two percent of the administrators agreed that offshore outsourcing creates a financial benefit to the companies involved in this activity. Seventy seven percent (77%) indicated that offshore outsourcing stimulates innovation (see Figure 16). Ninety five percent (95%) acknowledged that offshore outsourcing or some other factors have caused reduced student enrolments.

A Venn diagram in Figure 13 shows that taken on their own, the dotcom bubble bursting scoops 60% of the votes and offshore outsourcing 90%, as causes for reduced student enrolment. This is not accurate because double votes are allowed, and also there are other causes not included in this balloting, for example productivity increases reduce the pool of jobs that are available for hire in IT/IS. There is a vindication on part of the researcher, that offshore outsourcing seems to have the upper hand, the research has established a foothold with support from the vanguards of the U.S. IT/IS education. Arguing the case for or against causes, is good to some extent, but only in as far as it helps find a solution to the problem. This discussion on causes should not reduce focus on the main problem of reduced student enrolments. If votes were cast on who wants to have the enrolment grow, a 100% vote in favor of would probably go on the record (in other words a unanimous vote that is immune to a presidential veto).

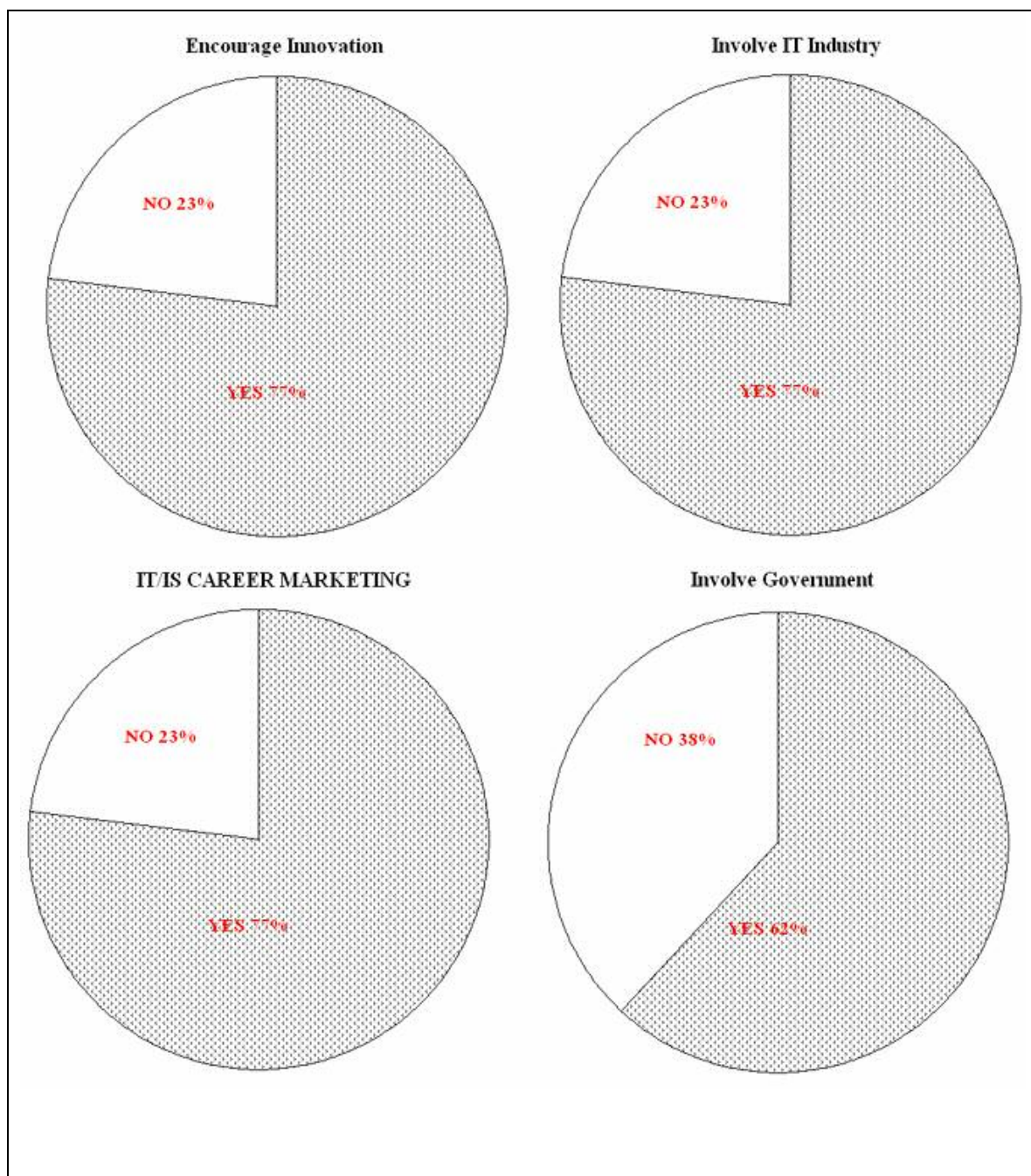


Figure 16. Offshore Response Actions – Concerned Administrators

On the other hand, the dotcom bubble bursting occurred more than six years ago. Current freshmen in college were in middle school, and probably do not know what a dotcom bubble means in terms of choosing a future career in IT/IS. However, if they

were asked about Myspace.com, YouTube, eBay, and Google, they would probably know more than an average citizen would want them to. As for how much they would say concerning jobs going to India or China, that may not sound as alien as the dotcom bubble bursting. Another aspect is that, the dotcom bubble bursting was a one-time event, whose memory will fade into history. In sharp contrast however, offshore outsourcing may have started its long and lasting journey. Therefore, the debate should not be concentrated on what appears to be known causes. Doing so poses a risk of undermining the search for solutions to build the once great image of an IT/IS career. The solution that may be eluding the IT/IS education system, is setting a priority focus on how to get more and more students rash into programs for the next hi-tech paradigm shift.

The Last Call to Arms

The majority of universities have taken steps to raise the student enrolments. Concerns were raised that offshore outsourcing could become “a self fulfilling prophesy”. This is a likely scenario as a result of inadequate action by the role players in the IT/IS education system. The system includes IT/IS administrators and faculty, students, government, professional organizations, media and the IT Industry. Whereas some universities are positioned to be effective players at an IT/IS renaissance, others are not (see Figure 16). Some role players have given student training in offshore management skills, and internships. Some Administrators have acted to change student programs by; increasing marketing of the IT/IS profession, collaborating with the IT Industry, calling on federal and state government to support IT/IS or science programs in general.

Attention is drawn on some simple statements made by administrators in this study. The following was said about offshore outsourcing:

- A short-term negative aspect
- Offshore outsourcing is a positive trend in the long run
- Offshore outsourcing creates an opportunity on how to be more clever and compete
- Offshore outsourcing is taking low salary paying jobs to overseas nations

The issue of offshore outsourcing should not be over-simplified, and diminish the extent of its implications. There is a formidable problem of reduced IT/IS student enrolment in U.S. universities. The causes could be many, but offshore outsourcing and the dotcom burst were the leading ones. The urgent need is reversing the ominous trend of declining IT/IS student enrolments. There are several steps or approaches that can be taken. A number of groups of people or organizations can make a significant contribution to resolving the problem. Among these are university administrators, who should take leadership in the fight. IT/IS employers, faculty, students, government, and media can all be active role players in the quest to achieve success. Defeatism, or the wait and see approaches may not provide relief. It is doable and the cause is noble. Both combined and individual efforts from the different role players are needed. Innovation and thinking out of the box are indispensable attributes of the process to recovery. If it has worked for one university, then it can possibly work for all. The awakening comes in the words of Friedman (2005):

At one point, summing up the implications of all this, Nilekani uttered a phrase that rang in my ear. He said to me, 'Tom, the playing field is being leveled.' He meant that countries like India are now able to compete for global knowledge work as never before – and that America had better get ready for this (p.7).

The twenty randomly selected universities represent a wide spectrum of U.S. universities, with a minimum population of just over 5,300 and maximum of just under 50,000. Among those ones that participated, are 4 universities in the top 100 universities in the U.S., as ranked by the Princeton Review. The largest student number of a public university offering a 4-year degree in information systems and/or computer science is 54,169 (for the whole U.S.). The median population of the twenty universities is 11,464. Public Universities for the whole country are 622 (National Center for Education Statistics web page: <http://nces.ed.gov/ipeds/cool>) that graduate 4-year degrees in information systems and/or computer science. Universities for the whole country having a population of 5,000 or more, are 394 overall within the U.S. This leaves 228 as the number of universities that have a population below 5,000 students. Those with a population of 20,000 and above are 112. It is therefore clear that smaller universities / colleges are greater in number than the large ones (using 20,000 as the minimum for a large university).

There is a new race looming in the background. It is a race for the test of wills, a test for hi-tech values, a test for the bright and creative minds, a test for survival, a test for domination in the 21st century, a test of who in the pack can produce the best and brightest, a test of the global hi-technology psyche. The American kid should wake up every morning preparing for the grand challenge, or the grand finale to be brighter than the smartest Chinese or African kid out there. On the other side of this test, the Chinese or Indian kid should wake up everyday to be the most intelligent innovator, entrepreneur and inventor above every American kid on the block of high-tech whiz-kids and computer nerds of the future. This race may take a combination of the following

attributes to win, the courage and ferocity of a lion heart, the dexterity of a caterpillar for the turnaround, the fearlessness and tenacity of a Gila monster to stick to the prize, the congruity of a dove to make a home run, the strength of a shark bite to make the cut, and the flying superiority of a bald eagle to stay above and soar in the sky. Nevertheless, the sky is not falling tomorrow, America has and will survive. History also reminds us that Egyptians ruled the world, at another time it was the Romans, then the British, and now it is America. But for how much longer will America stay in the hi-tech and economic lead? What will it cost and take to maintain this lead? Hello, do you hear the call to arms?

What are the top three role players in this quest of improving IT/IS student enrolment? 1) IT/IS administrators 2) U.S. Government 3) Media. IT/IS administrators are number one because leaders must have a vision, and also be innovative. CEO perks come at a price for U.S. corporations. Perks are given as compensation for performance. When a company is not performing well, the seat of the CEO is given to another occupant, and this is a sufficient and necessary remedy. Even in politics, it was Thomas Jefferson that made the initial draft for the U.S. constitution, if he had crafted a “flimsy” document, America may have been different from what she is today. If the founding fathers (American leaders by 4th, July 1776) that declared American independence were not visionaries, history would be completely different.

The U.S. government is number two among the top three role players, because uncle Sam wields power and authority that humbled a towering Enron CEO. The sacred “cash cow” is owned by government, and when the keeper of the “cash cow” says; Let there be a mission to put a man on mars, so it will be. The media comes in as number three because, when more than half of the administrators said news media created a crisis,

then there is a cause to acknowledge the influence of this role player. News Media wields enormous power, even if it is neither legislative nor executive, they shape and control the American psyche. The media machine may be equated to being a surrogate of judicial powers, but devoid of courts, and it works, thanks to the first amendment in the Bill of Rights for the American constitution!

The following conclusions are made:

1. The loss of IT/IS jobs in the U.S. due to Offshore outsourcing is not a myth, it is happening faster than most university administrators may want to suggest.
2. The main solution lies not in preventing it, but looking for opportunities and thinking outside of the box, be innovative and also seek government support.
3. The media can be used as a tool to diminish the perceived threat, the needed actions may be short of being revolutionary. It may take acting like shrewd failing business corporations, when faltering and at the edge of bankruptcy.
4. The IT/IS career is still great, the opportunities exist, and worry should be relegated to the frail and non-performers, it is normal for some individuals to survive and others to be on the sidelines.
5. There is no “one size fits all” for the universities, a careful study and evaluation of each university’s unique capabilities and resources is important, leveraging those resources and taking advantage of their particular niches will play an important role to recovery.
6. As a cry for American independence, Mr. Patrick Henry said “GIVE ME LIBERTY OR GIVE ME DEATH?” (United States Citizenship and Immigration Services, 2007, p. 58) Students should picket at Capitol Hill

holding placards reading “GIVE ME A SCIENCE AND TECHNOLOGY EDUCATION OR SEND ME OFFSHORE”.

Implications

The main issue that universities face is increasing student enrolment numbers in IT/IS programs. This process can start with setting a goal such as raise enrolment by 20% over the next academic year. To get 20% more high school graduates entering IT/IS programs raises questions that need to be addressed. The first main question is; What does it take to achieve this goal? What are the implications of such a goal? First of all, the interest of extra students needs to be captured. Who runs the campaign to capture extra student numbers, and how can it be done? What resources are needed to achieve the goal of 20%? The second main question becomes; Where do students go after high school graduation? What follow up activity is needed? Where do they work after college? What are the employment needs and opportunities in the field? What support mechanisms need to be instituted? The study results suggest some answers in Figure 16.

The representations given in Figure 16 include; encourage innovation (77%), involve the IT industry (77%), increase marketing of IT/IS careers (77%) and government involvement (63%). These are all positive approaches towards achieving increased student enrolment. The debate on causes or where the blame lies for reduced enrolments is not relevant, it is important to recognize the problem exists. Identifying what needs to be done is more important, and overcoming obstacles to problems with a unified frontal attack. This is part of the many possible solutions.

A similarity will now be drawn from a medical student experience. The Medical student John, who started with a biology major in college, got admitted into medical school. John had a hospital ready to take him soon after graduation, with little or no concern about a job opportunity, except for the salary amount. This enabled John to concentrate on excelling in his profession, while both in school and during his internship. “Practicing” in the IT/IS profession should be looked at as the dream career waiting to happen after school. As a result, this will diminish the continuous effort needed to keep the flow of students into IT/IS programs. The media should be ready to report how fantastically the system is working, and that the American edge and spirit of conquering the technology frontier will stay alive throughout the decades.

Confidence building instead of uncertainty to a graduating or prospective student in IT/IS, requires a grassroots movement that provides assurance to any student. It implies that jobs will be available for any student, at the appropriate time and when needed. Another action that was identified in this research was appealing to “uncle Sam’s big purse”, or government funding. About 45% of the universities reported discussions with state or federal officials, including members of congress. If it is a people’s congress, why not? Imagine what impact would result if half the number of H1Bs visas were slashed in next years’ quota? Is it a practical solution? Why not? Does academia have any lobbyists on capital hill? Well, a unanimous voice may be quoted saying; For what? How can one talk about not having lobbyists for the business industry on Capitol hill? It is unthinkable for that to happen, or a re-write of the U.S. laws banning lobbying is needed. It is granted that academia is not business, it possibly will never be, but who sets the limits, when will the frontier be conquered? Can academia think outside of the box?

Absolutely! When the word government comes into the hearing of academia, “the tendency is to think of unwanted legislation” (Anonymous, personal communication, June, 2006). A greater number of legislation in congress must be positive, otherwise the institution might have collapsed long before the iron curtain and communism, if it had been a repressive body.

Here below is a list of implications.

1. It is implied that reduced IT/IS student enrolment is largely contributed by offshore outsourcing and the dotcom bubble bursting. The choice of how universities respond to this problem remains to be seen through the actions they take.
2. It is implied that government has a lot on the congressional agenda.
Universities need to do more to influence educational agenda on Capitol hill.
3. It is implied that the IT firms or U.S. corporations benefiting from offshoring have no signs of letting up. If this activity is based on “corporate survival instincts”, then the stakeholders haven’t seen nothing yet!
4. It is implied that if “prospective students” get a consistent message that offshore outsourcing is taking all future IT/IS jobs overseas, the reduced enrolment problem will persist.
5. It is implied that news media have been the major catalyst to the student enrolment problem.

A note about news media: The first amendment is a constitutional and guaranteed right, they will keep saying what “in their judgment” generates spin. This can be a

blessing in disguise because the first amendment in the bill of rights does not favor one side more than the other opposing side.

Recommendations

The challenge faced by educators and IT/IS departments in colleges, is the decision on how to offer relevant training to IT/IS students, not only in response to offshore outsourcing but any other significant and undesirable factor. It might lead to the evolution of a new kind of training, which would create a new generation of IT/IS graduates. As IT/IS jobs move offshore, IT/IS graduates need the ability to integrate knowledge in accounting, business law, economic and management principals. Computer science and information systems departments need to adjust their training to better prepare students for a globally competitive IT/IS workplace, given the current and dynamic offshore outsourcing trends.

Whereas college education is different from the businesses operating to generate profit, there are important lessons and principals to learn from business. There are components or concepts that can be used in universities emulating business practices. For example, profit can be measured in terms of students graduating with available jobs for them. If a significant and improved flow of incoming and outgoing student numbers is not sustainable, then IT/IS education becomes like a business continually losing money that consequently collapses.

The struggle to boost student numbers is not a one group's (role players) winning strategy type, there are several groups that need to engage in a proactive fight to achieve success. The educators, students (high schools and colleges), IT/IS employers,

professional organizations, media and government constitute the several groups that can make the difference. Failure to recognize the interdependency and roles each one should play is a disadvantage. The call to action has to happen now, and continuously so. A concerted effort will ensure a faster approach to the navigation plan, start the voyage and execute the urgent tasks and duties at stake. Achievable objectives need to be set, defined goals should be measurable. An evaluation system needs to be established so as to measure progress based on milestone accomplishments.

Responsibilities should be assigned, the communication and accountability should be transparent, lessons learned should be documented, and best practices developed for future progress. The philosophy behind “Kaizen” or continuous process improvement should be embraced (Goldratt, 1992). There should be room for innovation and thinking outside of the box. The productivity of such actions should be realistic, and also practices that re-invent the wheel should be avoided.

The most important strategy is to win, leadership lies with the university administrators, and the Innovation Technology Architect at the helm of navigation. A hands-off approach is neither an option nor the place to find comfort. Appointment of an Innovation Technology Architect (InTA) to take charge of the specified activities is recommended. The job description and responsibilities of such an architect are described in Appendix K. Nothing described here is etched in stone, these recommendations should be looked at as a working document, or a work in progress, the process should be allowed to grow, mature, evolve and re-invent itself.

Here below is a list of recommendations:

1. It is recommended that the IT/IS college administrators act to reverse the trend, and bring back the glory and following IT/IS commanded in the 1990s.
2. It is recommended that the administrators adjust the IT/IS student curriculum tailored to the new emerging jobs in technology, which are less prone to offshore outsourcing.
3. It is recommended that university administrators work with IT industry to “secure” jobs for graduating students.
4. It is recommended that administrators define benchmarks to increase student enrolments with all the resources they can muster. They need to set benchmarks having defined goals, targets and milestones. A continuous review and evaluation of these benchmarks should be conducted. This can ensure that progress is not hindered, or obstacles are discovered and solutions sought to overcome them. Roles should be defined, tasks planned and responsibilities assigned to the role players in this whole process.
5. It is recommended that administrators and faculty introduce internationalism in course training. They should provide some internships to offshore countries.
6. It is recommended that university administrators review the tuition rates so that IT/IS education is affordable or atleast follows the rate of inflation.
7. It is recommended that university administrators setup a powerful lobby group at Capitol Hill to promote science, technology, engineering and math programs.

8. It is recommended that universities develop an honor system for exceptional student and faculty talent in science, math, hi-technology, engineering and math programs.
9. It is recommended that government creates an enabling environment to improve student enrolment in IT/IS, science, math and engineering programs.
10. It is recommended that government adopts a coherent national strategy on offshore outsourcing.
11. It is recommended that as part of the presidential and congressional oath, or swearing in, the following should be included: “I solemnly swear to up hold the science, engineering, math and high-technology leadership of the United States of America”, so help me God.
12. It is recommended that a bi-partisan (or tri-partisan, including independents) agenda be followed towards support for science, engineering and high technology programs with funding, and no filibusters or partisan rancor.
13. It is recommended that a bill is passed by congress establishing an honor system for individuals making scientific breakthroughs, for example the “technology medal of honor”, “technology medal of innovation”, or the “science bronze star” achievement award for the United states of America.
14. It is recommended that the Education Secretary institutes direct programs promoting science, hi-technology, engineering and math programs (with input from universities) into the high-school curriculum, but in such away that universities can concentrate on their core values in delivering college education.

15. It is recommended that IT industry considers extending tuition reimbursement for fresh graduates from U.S. universities.
16. It is recommended that news media report fair and balanced news, especially on offshore outsourcing. The reports should be patriotic and objective as well.

This study was conducted for the South and Northeast regions of the United States, and a study of the West and Midwest is proposed. A longitudinal study on how individual interventions are working can be conducted. This can help identify the most effective approaches or methods in increasing student enrolment. An industry perspective on offshore outsourcing for firms in the United States may be investigated. Investigating evidence on sophisticated activities that U.S. companies may be conducting abroad is suggested. The notion that only low level programming jobs or repetitive IT/IS work are going offshore requires empirical evidence. The development of concepts and theory on offshore outsourcing is proposed.

Inferential or representative statistics on offshore outsourcing is a possible area of further study. The detailed identification of specific courses and skills that are less prone to offshore outsourcing is another area recommended for further research. Another area for further study is identifying the IT industry's concerns on reduced student enrolments. Another investigation can be identifying remedies the IT industry considers when faced with a shortage of fresh graduates needed for hire. Those are some of the issues that merit additional research work.

Summary

The main topic in this study was the analysis of offshore outsourcing perspectives from IT/IS college administrators. The responses from IT/IS administrators were elicited and the perceived relationship to student enrolment in IT/IS programs established. To address the enrolment problems created by IT/IS offshore outsourcing involves; IT/IS educators, students, parents, working IT professionals, IT employers, federal/state government, professional organizations and the news media. Each of these groups of people have a role to play, and yet none has the leverage to win the fight single handedly. They each have individual responsibilities, and yet a concerted effort is required to coordinate a combined attack on the problems that need to be overcome.

Whereas other causes were highlighted as contributors to lowered student numbers in IT/IS programs, the lions' share was attributed to offshore outsourcing and bursting of the technology boom of the 1990s. The recommended actions intended to reverse this undesirable trend are multi-faceted; Implementing curriculum reviews, redefining departmental marketing strategies for new students, advocating for government funding, advertisements in media, and seeking IT industry assistance among others. Specific activities have included: emphasis to give training in areas that are perceived to be "offshore proof", mandating internships both locally in the U.S., and in offshore countries.

This statement is expected to resonate with the would be "Achiever" or "the Hero" for that matter, in the fight to reclaim college leadership in IT/IS training; "If we have no students, then we have no department". The destructive clones of offshore outsourcing must be relegated to a defeated party, and their future will forever remain in infamy. It is

important to note that over 80% of the universities were not sure declining student enrolments had hit a bottom. The marketing of IT/IS programs, together with coalition forces of the willing, is needed to address the problems in the IT/IS academic community. The study identified new areas of training; bio-informatics, nano-technology, double majors or minors like forensic technology, security, data mining and many more. A new campaign selling IT/IS career training is needed. Support needs to be sought from industry and government in the areas of research and development. The electronic and print media has not hurt the business industry, why should universities not benefit by employing this media to advertise IT/IS programs?

Government at the federal or state level, provides the all important platform of creating an enabling environment. This goes for both business and universities, and the global economic dynamics as well. An administrator suggested that: "A balanced strategy for hiring outside nationals, and also developing an internal and sustained capacity of U.S. workers is needed". In exercising the balanced strategy, Government plays the active role of a referee. Government has the power of the purse, to give money to universities and support IT/IS educational programs. It also has the power of limiting or stopping unfair business practices that undercut IT/IS educational programs. The professional organizations provide strength behind numbers, they help give guidance, steer universities in a direction that has validity plus a certain level of unanimity, and intellectual capital.

With double voting allowed (see Figure 13), the dotcom bubble bursting scoops 60% of the votes and offshore outsourcing 90%, as causes for reduced student enrolment. Arguing the case for or against causes, is good to some extent, but only in as far as it

helps find a solution to the problem. If votes were cast on who wants to have the enrolment grow, a 100% vote in favor of would probably go on the record. Offshore outsourcing may have started its long and lasting journey. Therefore, the debate should not be concentrated on what seems to be the known causes. Doing so poses a risk of undermining the search for solutions to build the once great image of an IT/IS career. “Practicing” in the IT/IS profession should be looked at as the dream career waiting to happen after school.

Appendixes

Appendix A: Survey Instrument

The interview questions have two parts; A and B. Part A; questions 1 to 16 are for administrators with IT/IS offshore outsourcing concerns. Part B; questions 17 to 23 are targeted for those without concerns. University administrators include a dean or head of department, in colleges for IT/IS related programs. To provide for non-bias, there is a deliberate intention not to assume all respondents have concerns about IT/IS offshore outsourcing.

Interview Introduction to Administrators:

Administrators will be directly interviewed and electronic recording equipment shall be employed. Information will be provided to the respondents prior to a scheduled interview. The information to be sent before an actual meeting will include the interview questions, purpose of the interview, subject of the interview and an agreed time and venue for conducting the interview.

The procedure to be followed at the meeting will include:

- An introduction to the respondent
- Thank you statement for allowing the interview to be granted
- Statement on purpose of the meeting
- An overview on the subject to be discussed
- A request for permission to record the interview
- Conclusion of the interview
- Thank you comments to the respondent
- A statement on follow up of a transcript summary for the interview.
- Emailing a thank you letter (email) soon after the interview

Open Interview Questions to Administration

In this survey, IT/IS Offshore outsourcing is defined as a commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client (i.e. a U.S. IT/IS firm).

1. What is your perspective (views) on IT/IS offshore outsourcing?
2. Do you have any concerns towards student interest and enrolment in your college as a result of IT/IS offshore outsourcing? (leads to Part A for respondent with offshore outsourcing concerns, or part B if not concerned with offshore outsourcing)

Part A Administrator – with concerns

3. a) If you have concerns on IT/IS offshore outsourcing what are your main concerns?
b) How would you rate your concern on a Likert scale of 1 to 5, with 5 being the greatest concern?
4. How do these concerns affect your college training programs in IT/IS careers?
5. What are some of the direct effects you have experienced in your department/college due to the offshoring of IT/IS jobs?
6. a) Has the university experienced lowered student interest and/or enrolment in IT/IS programs?
b) If there has been a decline in student enrolment, are there other factors attributable to this decline?
c) What percentage of student declines have you experienced, is it down to say 80%, 50%, what number can you give in your estimate?
7. a) Has the university taken specific steps to address lower student enrolment due to IT/IS offshoring?
b) What steps have you taken?
8. Has your university approached the IT/IS industry to specifically discuss future domestic job opportunities for IT/IS students in response to IT/IS offshore outsourcing?
9. a) Has your university taken action in raising the IT/IS offshore outsourcing concerns to state and federal governments?
b) If you have raised these concerns to state or federal officials what are the expectations / results from this action?
c) How about Government intervention in supporting your programs to increase high school student interest in science and math programs? Or lobbying State and Federal Government to increase the budget or spending in science and math programs?
10. a) Do you belong to a professional organization that is addressing the IT/IS offshore outsourcing concerns?
b) What experience has come out of the professional organizations you belong to?

11. Do you believe offshore outsourcing creates a financial benefit to firms involved in this activity?
12. Do you believe there is an overall economic benefit to create more jobs through innovation into new areas or technologies as a result of IT/IS offshore outsourcing?
13. What are the advantages / disadvantages of offshore outsourcing?
14. What extra comments do you have about offshore outsourcing in IT/IS and jobs being lost to overseas countries?
15. What employment opportunities do you experience for your IT/IS graduates?
16. Do you have a percentage number associated with how many of your graduates get hired in IT/IS careers, not later than 6-months after their graduation?

Part B Administrators - without IT/IS Offshoring concerns

17. If IT/IS offshore outsourcing is not a concern to you, why has it caused concern with some college Administrators?
18. What consequences do you consider will (or have) arise out of this 'mis-conception'?
19. Have you received any questions from your faculty or students about the IT/IS offshore outsourcing issue?
20. a) What has the student enrolment trend been at your university, have you had a drop or an increase over the last 1 to 4 years?
b) If you have had a drop in enrolment, what do you perceive to be the cause for that decrease?
21. What extra comments do you have concerning IT/IS offshore outsourcing?
22. What employment opportunities do you experience for your IT/IS graduates?
23. Do you have a percentage number associated with how many of your graduates get hired in IT/IS careers, not later than 6-months after their graduation?

Appendix B: Pilot Interview Script with a College Dean

This is a transcript summary of a recorded video interview I had with a Dean in a Mid-Western part of the United States concerning IT/IS Offshore Outsourcing dissertation research conducted in June, 2006.

About The Dean:

The Dean College of Business, he has worked as CEO in his career.

The Dean's responses are in bold, this transcript was also sub-edited by the respondent.

1. What is your perspective (or views) on IT/IS offshore outsourcing?

Partly there is a media mis-representation of offshore outsourcing as a cause to low student enrolment. It is not necessarily low labor cost availability in offshore countries that encourage IT firms to outsource offshore.

The negative concern is that offshore outsourcing has affected student enrolment to such an extent that 5 to 6 years from now, the country will have to in-source IT/IS graduates (or professionals) from other countries and be brought to work here in the United States. The graduates being produced today are not meeting the IT/IS Industry's hiring needs of today, and this will only be worse in 5 to 6 years time.

The appropriate response today that universities should take is to revise the curricula.

There are issues of a competitive environment that IT firms face today, these issues require them to outsource, otherwise they will not survive in business.

2. Do you have any concerns towards student interest and enrolment in your College as a result of offshore outsourcing? (leads to Part A or B)

Not in the sense of cheap labor overseas.

How would you rate your concern on a Likert scale of 1 to 5, with 5 being the greatest concern?

definitely 5

My greatest concern is a misperception by the public that there are no jobs available for IT/IS graduates, and the false explanation that it is only caused by the availability of cheap labor costs in offshore countries.

A quotation the Dean made that the interviewer finds inconsistent to labor costs as being a strong factor in IT/IS Offshore outsourcing is here below:

“If you want to have a local product pay for it. You put your money where your mouth is. If you can't pay for it, then we have to accept it (offshore outsourcing) as a reality”

3. If you have concerns on IT/IS offshore outsourcing what are the main concerns?

There is a strong mis-perception that has characterized the public (public referring to students and their parents who take decisions and provide guidance on a career path at college). Parity, rather than cost advantages alone is the main force pushing companies to outsource offshore. We are not producing the needed pool of graduates today that the industry needs.

4. How do these concerns affect your student training programs in IT/IS careers?

We have had to revamp the CIS program, fewer faculty have had to be hired. We down sized on our CIS faculty. The changes have been made to such an extent that I cannot effect more changes. The irony is that I cannot satisfy the market need for IT/IS graduates.

5. What are some of the direct effects you have experienced in your department/college due to the offshoring of IT/IS jobs?

Raising student interest in IT/IS programs is being pursued at the High school level through the running of a summer camp for high school graduates during summer. Professionals from IT firms are invited to make presentations at these camps. The IT/IS program requires flexibility and it also needs to be broad.

6. a) Has the university experienced lowered student interest and/or enrolment in IT/IS programs?

There has been a drop in student enrolment in the CIS program from an average of 400 to 170. The program had to be completely re-engineered. IT industry experts worked with our team to redesign the program according to a 2002 Model curriculum.

b) If there has been a decline in student enrolment, are there other factors attributable to this?

No, Not really.

c) What percentage of student declines have you experienced, is it down to say 80% or 50%, what number can you give as an estimate?

50% to 60%. Enrolment in IT/IS programs went down, whereas it has been going up in other programs within the College of Business

7. a) Has the university taken specific steps to address lower student enrolment due to IT/IS offshoring?

Re-engineering of the CIS program, instituting summer camps where high school students and their parents are invited. This is done so as to raise their interest in IT/IS programs.

b) What steps have you taken?

Revised the curricula, merged the CIS department with other programs in the college

8. Has your university approached the IT/IS industry to specifically discuss future domestic job opportunities for IT/IS students in response to IT/IS offshore outsourcing?

The IT/IS Industry was involved in the re-design of the IT/IS programs. Experts from industry are invited to high school summer camps.

9. a) Has your university taken action in raising the IT/IS offshore outsourcing concerns to state and federal governments?

No. Government intervention should be secondary in finding a solution to low student enrolment and offshore outsourcing problems. Barriers should not be created through taxation, or the imposing of restrictions on certain products (or IT/IS services) by specifying where they must be produced.

How about Government intervention in supporting your programs to increase high school student interest in Science and Math programs? Or lobbying State and federal Government to increase the budget or spending in Science and Math programs?

You are right. The first thing whenever government is mentioned is often negative, or we tend to go on the defensive. But yes government could play a positive role in supporting programs that would enhance student interest in IT/IS.

b) If you have raised these concerns to state or federal officials what are the expectations / results from this action?

We have not done that.

10. a) Do you belong to a professional organization that is addressing the IT/IS offshore outsourcing concerns?

Not really.

b) What experience has come out of the professional organizations you belong to?

Not applicable.

11. Do you believe offshore outsourcing is a financial benefit to firms involved in this activity?

No. Unless if benefit is defined as being viable.

12. Do you believe there is an overall economic benefit to create more jobs through innovation into new areas or technologies as a result of offshore outsourcing?

The nature of business skills needed in companies has changed. New careers are emerging due to offshore outsourcing. A business now needs someone who can identify the business needs, and identify how those needs can be met. Hewlett Packard for example has hired a lady that goes around the globe to train and establish that HP subsidiaries all over the world are running their activities the HP way, and ethically doing so. New skill sets are now needed in IT/IS careers.

13. What are the advantages / disadvantages of IT/IS offshore outsourcing?

There is a need to identify and look for new opportunities, like the example given in #12

14. What extra comments do you have about this offshore outsourcing in IT/IS and jobs being lost to overseas countries?

The era of excessive salaries paid to CEOs that are not performance related is facing a demise. Extremely high salaries to IT/IS executives has been part of the problem that can be associated with offshore outsourcing.

15. What employment opportunities do you experience for your IT/IS graduates?

Our IT/IS graduates are highly employable after their graduation.

16. Do you have a percentage number associated with how many of your graduates get hired in IT/IS careers, not later than 6-months after their graduation?

The university statistics suggest 98% of our graduates get employed in their IT/IS field of training.

Appendix C: Research Protocol

by

Martin Bagaya

Submitted as Requirement for IRB Approval

Nova Southeastern University

A preliminary dissertation proposal
submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy

Description of Study**Purpose and Potential Benefits:**

University college programs in information technology and information systems (IT/IS) are faced with the consequences of offshore outsourced job positions whose implications has resulted into reduced student enrolment in the IT/IS related programs. This problem has stimulated certain changes in the delivery of IT/IS college education. This research is intended to empirically determine the changes and consequences of the job-market loss problem due to offshore outsourcing by U.S. firms, to cheap labor foreign countries. This research is intended to investigate perspectives and mitigation measures

being adopted by the IT/IS college administrators, namely college deans and department heads in 4-year degree state universities within the United States.

Concerning insights into offshore outsourcing, Marcus (2004) raises three questions: "What is happening? How do we understand it? And what can we expect in the future?" (p. 14). These three questions are rephrased within the context of this research proposal: What is happening in the colleges offering IT/IS classes? How can administrators in IT/IS programs get a better understanding and approach to the current job market for their undergraduate students? How can the IT/IS educators and implementers train graduates for future employment? What should the IT/IS graduates expect in the job market for the future? Specifically, this study is going to examine the following research questions:

Questions on Educator's Concerns of Offshore Outsourcing in IT/IS

1. What are the concerns in U.S. universities due to IT/IS offshore outsourcing, in relation to interest and enrolment by students in IT/IS programs?
2. What are the prevailing consequences of IT/IS offshore outsourcing on undergraduate training for IT/IS programs?
3. What are the specific changes in IT/IS university programs that can be attributed to IT/IS offshore outsourcing?

Goals

Using structured interviews with IT/IS college administrators, this research is intended to achieve the following goals:

- Identify the concerns of IT/IS offshore outsourcing in U.S. universities

- Identify the consequences in IT/IS student training resulting from the job-market loss problem due to offshore outsourcing
- Identify changes stimulated by the offshore outsourcing of jobs to overseas countries
- Develop guidelines for future research, and also make possible recommendations.

Location of Study

The study will be conducted from at least two of the four regions of the United States divided in four strata, and to be randomly selected. The stratified regions are identified as:

- South (14), VA, WV, KY, NC, SC, TN, GA, FL, AL, MS, AR, LA, OK, TX
- Northeast (12)-ME, VT, NH, MA, CT, NY, RI, NJ, PA, DE, MD, DC
- Midwest (12)- ND, SD, NE, KS, MO, IA, MN, WI, IL, IN, MI, OH
- West (13)- WA, OR, ID, MT, WY, CO, NM, AZ, UT, NV, CA, HI, AK

Dates of Study

The initial contact with Universities is expected to be started in the fall semester of 2006. The process of collecting data is expected to start in the fall semester of 2006 and be continued into the Winter semester of 2007 if necessary.

Subjects:

The subjects will be either a college dean or head of department in IT/IS college programs for any of the following programs; Information Technology, Information Systems, Computer Information System or Computer Science.

Sample Size and Composition

It is estimated that a representative sample of college university administration (deans/department heads) from a population of 466 universities (specified by the

Department of Education and Statistics as title IV institutions receiving federal funding and awarding 4-year college degree programs in IT/IS related programs) will be interviewed (National Center for Education Statistics, 2005). The exact sample size will depend on the availability of grant funds but within the range of 3% to 6% of the universities. With grant funds available, this sample may be 10% to 25% of the university population.

Subject Selection and Eligibility Requirements:

The dean or head of department that will participate in the interviews must be in a college or department that has registered and ongoing career training programs in any of the following programs; information technology, information systems, computer information systems or computer science.

Methods and Procedures:

Structured and recorded interviews will be held with the respondents in this research; that will be a college dean or head of department for the participating university. The interviews will be scheduled in agreement with the respondents. Other forms of communication with the respondents like email and telephone may be utilized. The study process will involve scheduling appointments at different universities to establish contact and introduce the research topic. At the earliest stage, the main subject of discussion will be seeking permission to conduct the proposed research in a particular university. Also procedures (defined by the participating university) for approval in any participating university will be followed.

Subject Recruitment:

As mentioned earlier, the selection process will be by statistical random sampling from a stratified sample divided in four regions of the United States. There is a total of

466 Universities, derived from the National Center for Education Statistics. The universities are identified as Title IV, receiving federal funding and also awarding 4-year college degree programs in IT/IS related disciplines.

Measures and Administration

The respondent permission will be sought prior to the conducting of an interview. An advance notice will be provided to the respondent that the interview process is voluntary and the participant can chose to withdraw at any time when started. An appointment time and venue will be requested to be setup. The permission to record the interview will be requested in advance before the actual date of the interview. The respondent will be informed that the interview transcript will be written shortly after the interview and the comments sought to confirm the researcher's interpretation and documentation of the responses from the respondent. The survey instrument having interview questions is given at the end of this document.

Subject Confidentiality:

Strict confidentiality will be maintained at all times. Identifying information for dean or department head will be protected against unauthorized access. Contact records will be deleted at the conclusion of the study. Contact records will be maintained on a computer with a password for the duration of the study, and a disk backup stored in a government-classified safe. All reporting will be made in the aggregate and names and colleges will not be used to identify any particular individual. Any demographic information will only be accessible to the researcher and protected against intrusion and unauthorized access. The user tables storing the data will have "write-only" permission.

Participant names of Universities or individuals will not be used in the reporting of information in publications or conference presentations. The results of the study will

be reported in terms of the various treatment groups, not in terms of identifying information. Therefore anonymity and confidentiality will be protected.

Potential Risks to Subjects:

Confidentiality and loss of privacy:

Likelihood: rare

Minimization: See the Confidentiality subject above

Risk/Benefit Ratio:

The risk to subjects is judged to be very unlikely. The benefit to participants are not easy to measure or establish in the short term. However, it is expected that the research will identify perspectives from U.S. IT/IS college administrators, identify the consequences and changes resulting from IT/IS offshore outsourcing by U.S. firms. Universities will learn new lessons on the different approaches being adopted to address the stigma and implications of offshore outsourcing from their peers or counterparts. This research will generate a new body of knowledge, which is presently very limited or unknown in the research community.

Consent Forms

Consent will be sought from the participating respondents in each University.

Please see sample email requesting consent and a consent form exhibit towards the end of this section.

References to IRB Protocol

- Marcus, A. (2004). Insights on Outsourcing. Retrieved April 13, 2005 from http://0-portal.acm.org.novacat.nova.edu/ft_gateway.cfm?id=1005270&type=pdf&coll=ACM&dl=ACM&CFID=24451842&CFTOKEN=85916839
- National Center for Education Statistics (2005). Table 168. Enrolment, staff, and degrees conferred in postsecondary institutions participating in Title IV programs, by level and control of institution, sex, and type of degree: Fall 2003 and 2003-04.

Survey Instrument

The interview questions have two parts; A and B. Part A, questions 1 to 16 are for administrators with IT/IS offshore outsourcing concerns. Part B; questions 17 to 23 are targeted for those without concerns. University administrators include a dean or head of department, in colleges for IT/IS related programs. To provide for non-bias, there is a deliberate intention not to assume all respondents have concerns about IT/IS offshore outsourcing.

Interview Introduction to Administrators:

Administrators will directly be interviewed and electronic recording equipment shall be employed. Information will be provided to the respondents prior to a scheduled interview. The information to be sent before an actual meeting will include the interview questions, purpose of the interview, subject of the interview and an agreed time and venue for conducting the interview.

The procedure to be followed at the meeting will include:

- An introduction to the respondent
- Thank you statement for allowing the interview to be granted
- Statement on purpose of the meeting
- An overview on the subject to be discussed
- A request for permission to record the interview
- Conclusion of the interview
- Thank you comments to the respondent
- A statement on follow up of a transcript summary for the interview.
- Emailing a thank you letter (email) soon after the interview

Open Interview Questions to Administration

In this survey, IT/IS Offshore outsourcing is defined as a commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client (i.e. a U.S. IT/IS firm).

1. What is your perspective (views) on IT/IS offshore outsourcing?

2. Do you have any concerns towards student interest and enrolment in your college as a result of IT/IS offshore outsourcing? (leads to part A for respondent with offshore outsourcing concerns, or part B if not concerned with offshore outsourcing)

Part A Administrator – with concerns

3. a) If you have concerns on IT/IS offshore outsourcing what are your main concerns?
- b) How would you rate your concern on a Likert scale of 1 to 5, with 5 being the greatest concern?
4. How do these concerns affect your college training programs in IT/IS careers?
5. What are some of the direct effects you have experienced in your department/college due to the offshoring of IT/IS jobs?
6. a) Has the university experienced lowered student interest and/or enrolment in IT/IS programs?
- b) If there has been a decline in student enrolment, are there other factors attributable to this decline?
- c) What percentage of student declines have you experienced, is it down to say 80%, 50%, what number can you give in your estimate?
7. a) Has the university taken specific steps to address lower student enrolment due to IT/IS offshoring?
- b) What steps have you taken?
8. Has your university approached the IT/IS industry to specifically discuss future domestic job opportunities for IT/IS students in response to IT/IS offshore outsourcing?
9. a) Has your university taken action in raising the IT/IS offshore outsourcing concerns to state and federal governments?
- b) If you have raised these concerns to state or federal officials what are the expectations / results from this action?
- c) How about Government intervention in supporting your programs to increase high school student interest in science and math programs? Or lobbying State and Federal Government to increase the budget or spending in science and math programs?
10. a) Do you belong to a professional organization that is addressing the IT/IS offshore outsourcing concerns?
- b) What experience has come out of the professional organizations you belong to?
11. Do you believe offshore outsourcing creates a financial benefit to firms involved in this activity?
12. Do you believe there is an overall economic benefit to create more jobs through innovation into new areas or technologies as a result of IT/IS offshore outsourcing?
13. What are the advantages / disadvantages of offshore outsourcing?

14. What extra comments do you have about offshore outsourcing in IT/IS and jobs being lost to overseas countries?
15. What employment opportunities do you experience for your IT/IS graduates?
16. Do you have a percentage number associated with how many of your graduates get hired in IT/IS careers, not later than 6-months after their graduation?

Part B Administrators - without concerns

17. If IT/IS offshore outsourcing is not a concern to you, why has it caused concern with some college Administrators?
18. What consequences do you consider will (or have) arise out of this 'mis-conception'?
19. Have you received any questions from your faculty or students about the IT/IS offshore outsourcing issue?
20. a) What has the student enrolment trend been at your university, have you had a drop or an increase over the last 1 to 4 years?
b) If you have had a drop in enrolment, what do you perceive to be the cause for that decrease?
21. What extra comments do you have concerning IT/IS offshore outsourcing?
22. What employment opportunities do you experience for your IT/IS graduates?
23. Do you have a percentage number associated with how many of your graduates get hired in IT/IS careers, not later than 6-months after their graduation?

Consent Email

My name is Martin Bagaya,

I am a doctoral dissertation student from Nova Southeastern University. I am conducting a dissertation research titled “IT/IS Offshore Outsourcing: Educator and Student Perspectives”.

Under this research IT/IS offshore outsourcing is defined as:

A commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client.

The purpose of this email is to request your participation in this research study. The study will be conducted by using an interview format where by the researcher will be asking specific survey questions. You will be provided with the list of questions in advance, before the actual interview. Your university was randomly selected to participate in this study. Your involvement is voluntary and you can opt out of the study at any time.

Results of the research shall be reported in aggregated groups, and with no identifying information. Any personal data (for example name of your university, email or telephone) in reference to your involvement shall be deleted at the conclusion of the study. Storage of files and transcripts relating to the interview shall be saved on a secure server, prohibiting un-authorized access. The interview extracts will strictly be confidential. No reference to your participation as an individual will be made in any reporting, or presentation at any conference. You will be requested to sign a consent form just before the interview. You can also respond by email consenting to this process.

Thank you,

Martin Bagaya.

cc. Dissertation Advisor

Consent Form Exhibit:

My name is:

I voluntarily consent to participate in the dissertation interview research on IT/IS Offshore outsourcing. I understand that this interview is confidential and my privacy will be protected. I have not been coerced into participating in this research study. I am at least 18 years old, and participate as a consenting adult in this exercise.

Respondent Signed

Date

Researcher Signed Martin Bagaya

Date

Appendix D: University List, Northeast and South

No.	UNIVERSITY	CITY	STATE	No_Stud	REGION	No.	UNIVERSITY	CITY	STATE	No_Stud	REGION
1	Angelo State University	San Angelo	TX	6,156	South	28	CUNY Lehman College	Bronx	NY	10,615	Northeast
2	Appalachian State University	Boone	NC	14,653	South	29	CUNY Medgar Evers College	Brooklyn	NY	5,211	Northeast
3	Arkansas State University-Main Campus	State University	AR	10,414	South	30	CUNY New York City College of Technology	Brooklyn	NY	12,439	Northeast
4	Arkansas Tech University	Russellville	AR	6,842	South	31	CUNY Queens College	Flushing	NY	17,638	Northeast
5	Armstrong Atlantic State University	Savannah	GA	6,688	South	32	CUNY York College	Jamaica	NY	5,899	Northeast
6	Auburn University Main Campus**	Auburn University	AL	23,333	South	33	East Carolina University	Greenville	NC	23,164	South
7	Augusta State University	Augusta	GA	6,312	South	34	East Stroudsburg University of Pennsylvania	East Stroudsburg	PA	6,793	Northeast
8	Austin Peay State University	Clarksville	TN	8,813	South	35	East Tennessee State University	Johnson City	TN	11,894	South
9	Bloomsburg University of Pennsylvania	Bloomsburg	PA	8,570	Northeast	36	Eastern Connecticut State University	Willimantic	CT	5,113	Northeast
10	Bowie State University	Bowie	MD	5,319	Northeast	37	Eastern Kentucky University	Richmond	KY	16,219	South
11	Bridgewater State College	Bridgewater	MA	9,649	Northeast	38	Edinboro University of Pennsylvania	Edinboro	PA	7,691	Northeast
12	California University of Pennsylvania	California	PA	7,184	Northeast	39	Farmingdale State University of New York	Farmingdale	NY	6,461	Northeast
13	Cameron University	Lawton	OK	5,880	South	40	Fashion Institute of Technology	New York	NY	10,381	Northeast
14	Central Connecticut State University	New Britain	CT	12,315	Northeast	41	Fayetteville State University	Fayetteville	NC	6,072	South
15	Clarion University of Pennsylvania	Clarion	PA	6,338	Northeast	42	Fitchburg State College	Fitchburg	MA	5,340	Northeast
16	Clayton State University	Morrow	GA	6,212	South	43	Florida Agricultural and Mechanical University	Tallahassee	FL	12,154	South
17	Clemson University**	Clemson	SC	17,165	South	44	Florida Atlantic University	Boca Raton	FL	25,645	South
18	Coastal Carolina University	Conway	SC	7,613	South	45	Florida Gulf Coast University	Fort Myers	FL	7,249	South
19	College of Charleston	Charleston	SC	11,332	South	46	Florida International University	Miami	FL	36,904	South
20	College of William and Mary**	Williamsburg	VA	7,544	South	47	Florida State University**	Tallahassee	FL	39,146	South
21	Columbus State University	Columbus	GA	7,469	South	48	Framingham State College	Framingham	MA	5,874	Northeast
22	CUNY Bernard M Baruch College	New York	NY	15,756	Northeast	49	Frostburg State University	Frostburg	MD	5,041	Northeast
23	CUNY Brooklyn College	Brooklyn	NY	15,281	Northeast	50	George Mason University	Fairfax	VA	29,728	South
24	CUNY City College	New York	NY	12,360	Northeast	51	Georgia College and State University	Milledgeville	GA	5,662	South
25	CUNY College of Staten Island	Staten Island	NY	12,083	Northeast	52	Georgia Institute of Technology-Main Campus**	Atlanta	GA	17,135	South
26	CUNY Hunter College	New York	NY	20,843	Northeast	53	Georgia Southern University	Statesboro	GA	16,646	South
27	CUNY John Jay College Criminal Justice	New York	NY	14,295	Northeast	54	Georgia State University	Atlanta	GA	25,967	South

** Are the top ranked 100 U.S. Universities

No.	UNIVERSITY	CITY	STATE	No_Stud	REGION	No.	UNIVERSITY	CITY	STATE	No_Stud	REGION
109	SUNY College at Buffalo	Buffalo	NY	11,006	Northeast	136	The University of Texas at Austin**	Austin	TX	49696	South
110	SUNY College at Cortland	Cortland	NY	7,224	Northeast	137	The University of Texas at Brownsville	Brownsville	TX	13316	South
111	SUNY College at Geneseo	Geneseo	NY	5,484	Northeast	138	The University of Texas at Dallas	Richardson	TX	14480	South
112	SUNY College at New Paltz	New Paltz	NY	7,822	Northeast	139	The University of Texas at El Paso	El Paso	TX	19268	South
113	SUNY College at Oneonta	Oneonta	NY	5,859	Northeast	140	The University of Texas at San Antonio	San Antonio	TX	27337	South
114	SUNY College at Oswego	Oswego	NY	8,282	Northeast	141	The University of Texas at Tyler	Tyler	TX	5777	South
115	SUNY College at Plattsburgh	Plattsburgh	NY	6044	Northeast	142	The University of Texas-Pan American	Edinburg	TX	17048	South
116	SUNY Empire State College	Saratoga Springs	NY	9996	Northeast	143	The University of West Florida	Pensacola	FL	9632	South
117	Tarleton State University	Stephenville	TX	9141	South	144	Thomas Edison State College	Trenton	NJ	11224	Northeast
118	Temple University	Philadelphia	PA	33695	Northeast	145	Towson University	Towson	MD	18011	Northeast
119	Tennessee State University	Nashville	TN	8880	South	146	Troy University	Troy	AL	26880	South
120	Tennessee Technological University	Cookeville	TN	9313	South	147	University of Alabama at Birmingham**	Birmingham	AL	16572	South
121	Texas A & M University	College Station	TX	44910	South	148	University of Arkansas at Little Rock	Little Rock	AR	11896	South
122	Texas A & M University-Commerce	Commerce	TX	8777	South	149	University of Arkansas Main Campus	Fayetteville	AR	17821	South
123	Texas A & M University-Corpus Christi	Corpus Christi	TX	8365	South	150	University of Arkansas-Fort Smith	Fort Smith	AR	6787	South
124	Texas A & M University-Kingsville	Kingsville	TX	6662	South	151	University of Central Arkansas	Conway	AR	11375	South
125	Texas Southern University	Houston	TX	11903	South	152	University of Central Florida	Orlando	FL	44856	South
126	Texas State University-San Marcos	San Marcos	TX	27129	South	153	University of Central Oklahoma	Edmond	OK	15859	South
127	Texas Tech University	Lubbock	TX	28001	South	154	University of Connecticut**	Storrs	CT	23185	Northeast
128	Texas Woman's University	Denton	TX	11344	South	155	University of Delaware**	Newark	DE	20982	Northeast
129	The College of New Jersey	Ewing	NJ	6768	Northeast	156	University of Florida**	Gainesville	FL	49693	South
130	The Richard Stockton College of New Jersey	Pomona	NJ	7035	Northeast	157	University of Georgia**	Athens	GA	33660	South
131	The University of Alabama	Tuscaloosa	AL	21793	South	158	University of Houston	Houston	TX	35344	South
132	The University of Tennessee**	Knoxville	TN	28512	South	159	University of Houston-Clear Lake	Houston	TX	7853	South
133	The University of Tennessee-Chattanooga	Chattanooga	TN	8656	South	160	University of Houston-Downtown	Houston	TX	11484	South
134	The University of Tennessee-Martin	Martin	TN	6478	South	161	University of Kentucky**	Lexington	KY	25672	South
135	The University of Texas at Arlington	Arlington	TX	25432	South	162	University of Louisville	Louisville	KY	20726	South

Appendix E: Distance Travel Plan for Universities

	Residence	MD-409	CT-327	VA-126	VA-589	PA-532	PA-368	PA-269	DE-450	VT-561
Residence										
MD-409	6 0H11									
CT-327	264 4H43	267 4H48								
VA-126	72 1H25	73 1H26	326 5H47							
VA-589	168 2H56	168 2H57	422 7H18	99 1H45						
PA-532	253 4H13	251 4H13	456 7H43	246 4H14	343 5H46					
PA-368	99 1H48	103 1H54	175 3H20	160 2H57	257 4H29	303 4H59				
PA-269	167 2H56	165 2H55	315 5H25	222 3H58	319 5H29	139 2H41	194 3H24			
DE-450	55 0H59	58 1H04	212 3H48	116 2H08	212 3H40	281 5H00	48 0H58	171 3H23		
VT-561	476 8H28	480 8H34	271 4H27	538 9H37	634 11H09	615 10H41	383 7H07	476 8H24	426 7H40	
NH-510	460 7H56	463 8H02	196 3H24	521 9H05	617 10H37	635 10H57	371 6H34	503 8H29	409 7H08	188 3H13

196 3H24 means the distance between intersecting row and column is 196 miles and takes 3 hours and 24 minutes to drive. NH-510 are confidentiality state codes. Residence refers to a hotel accommodation.

Appendix F: ISWorld Posting Request

Dr. Wang,

I have started my interviews with universities. I completed my first Interview with University of *blank for confidentiality* – Director for Undergraduate Studies and Chair for Computer Science.

I am seeking permission to send a message on ISWorld about what I am doing. I am hoping that this will make it easier to contact and communicate with the Universities. What is sometimes happening is that some telephone receptionists do not give me a chance to talk to the administrators in IT/IS programs. For example I was asked by one of them “does the Dean know about it?” I said no. I felt that this is a barrier I can avoid through ISWorld.

I believe many of the administrators subscribe to ISWorld since it is devoted to academicians and PhD researchers. The professors have had many discussions on this subject. I think that an ISWorld message will help me reach the targeted respondents.

I request to know from the committee if what I am suggesting is acceptable. However, I have seen doctoral students from other universities post similar requests before.

Please refer to the attached file for the content of the intended message.

Thank you,

=====

Martin Bagaya.

Reply from Dr. Wang:

Martin,

I think it is a good idea to get the message out from ISWorld. Hopefully this will help you with the data collection process.

You have the approval to go for it.

Ling

ISWorld Posted Message

Research Investigation on of IT/IS Offshore Outsourcing: Educator Perspectives

My name is Martin Bagaya.

I am doing a dissertation research Titled: “An Analysis of IT/IS Offshore Outsourcing: Educator Perspectives” I am doing this research with Nova Southeastern University (Ft.

Lauderdale Florida). For this research, IT/IS relates to majors in CIS, CS, MIS undergraduate degree training.

Under this investigation, IT/IS Offshore outsourcing is defined as a commercial arrangement of transferring local IT/IS functions, assets, activities, products and services to a foreign contractor, therefore removing new employment positions, replacing or displacing U.S. domestic IT/IS workers with those from other countries for financial or competitive advantage of the outsourcing client.

This research is intended to determine empirically the changes and consequences of the job-market loss problem due to offshoring from the IT/IS educator's perspective. One goal in this research is to provide an understanding of the changes IT/IS offshore outsourcing is stimulating on university training in IT/IS programs. Another goal is to identify intervention measures that universities are employing in response to this phenomenon. The final results will include a list of recommendations that universities can use to address the student enrolment declines.

The university selection in this research is random, and for universities meeting a certain total student population criteria. These universities award undergraduate 4-year degrees in Computer science and/or information technology careers. Your participation as a University is voluntary. The targeted respondents are either a Dean or Head of Department. The respondent can be a person of a similar or equal rank, but only for IT/IS colleges and departments. In writing the final report for the investigation, the identity of the respondents will be kept anonymous. The reporting of results of this research will be in aggregate format and no identifying information will be revealed. The final dissertation report will be published with UMI ProQuest Digital Dissertations.

The interview takes about 30 minutes. This message is to let you know that Martin Bagaya may contact you to request an interview appointment.

Thank you,

Martin Bagaya

Dr. Wang,

I have done a total of 20 (or Universities) from the Northeast and South – 2 regions. In the dissertation proposal Chapter three, page 69, the first paragraph I wrote: “The exact sample size will depend on the availability of grant funds but within the range of 3% to 6% of the universities (please refer to research protocol in Appendix C).”

I have to date about 4% respondents based on 501 Universities, having a population of 5,000 and above. In the dissertation proposal page 69, first paragraph again I wrote: “It is estimated that a representative sample of college and university administration (deans/department heads) from a population of 466 universities (specified by the Department of Education and Statistics as title IV institutions receiving federal funding and awarding 4-year college degree programs in IT/IS related programs) will be interviewed.”

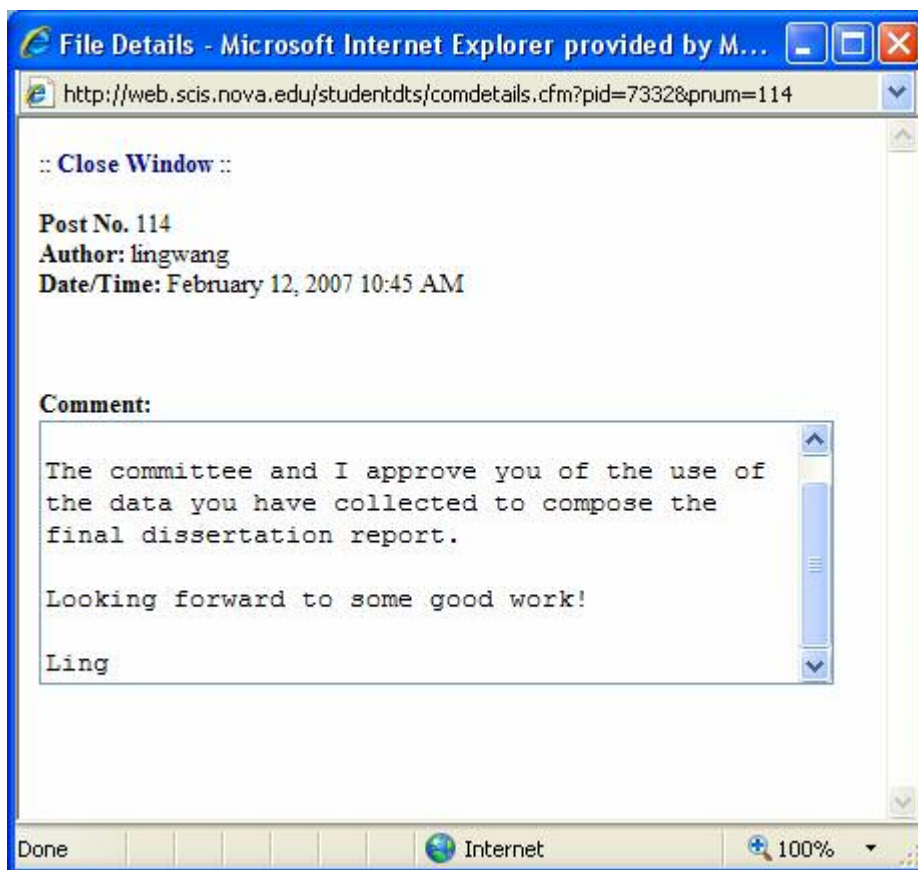
Based on the 466 number of universities, 20 makes about 4.3%.

I did not receive any funding on this research. My question is: Can I submit the 20 – university results and therefore be able to submit the final report with this number? I am asking the committee because I have gone beyond the minimum specified and approved in the dissertation proposal.

Thank you very much,

=====
Martin Bagaya

See next page for reply from Dr. Wang



Appendix G: Follow Up with Interviewed Participants

RE: Thank you for yesterday's Interview - Transcript is here

Dr. *Name of Participant*,

Thank you for being available for the interview I had with you *yesterday*. I appreciate your taking time to discuss with me amidst your busy schedule. Please find attached my interview transcript for checking correctness of my understanding of your answers. I request that you do a "Track Changes" in the word document so I can take care of the corrections you may suggest in the final transcript.

Thank you very much,

=====

Martin Bagaya

Reminder Email

Re: Reminder Student Enrolment/offshoring Transcript

Thank you for my interview with you on *date of interview* collecting your perspectives on offshore outsourcing & IT/IS student enrolment. I am in the process of writing up the dissertation report. This is a reminder to review the attached interview transcript for any corrections. After 1 week, I will assume that you consider the transcript content as being accurately representing your views.

Thank you very much,

=====

Martin Bagaya.

A typical reply on Content Validation from a Participant:

Quoting: [REDACTED]edu>:

Martin:

Sorry for the delay in getting back - this looks fine.

[REDACTED], Ph.D.
Chair, Electrical & Computer Engineering
[REDACTED]

Appendix H: Research Categories Spreadsheet

	UD-01	UD-02	UD-03	UD-04	UD-05	UD-06	UD-07	UD-08	UD-09	UD-10	UD-11	UD-12	UD-13	UD-14	UD-15	UD-16	UD-17	UD-18	UD-19	UD-20
Concerns	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
Likert Score	3	5	4	4	4.5	3	3	4	4.5	4	3	3	3	2.5	2	2	1	1	1	2
Changed Training	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y							
Reported Low Student Interest	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y							
Have other causes for low enrolment	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Current Student Enrolment	60%	70%	?	50%	67%	94%	60%	?	80%	65%	85%	50%	108%	60%	40%	50%	?	40%	110%	75%
Conduct Direct IT/IS Marketing	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y							
IT Industry Help Sought	N	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y							
Government Help sought	N	N	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y							
IT Firms Offshore for low Costs	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N							
Employment Rates	?	100%	99%	?	75%	?	80%	100%	100%	95%	?	100%	100%	95%	75%	90%	90%	100%	90%	100%
In Professional Organization	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y							
Innovation	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y							
Asked Offshore Questions														Y	N	N	N	Y	Y	Y

Yes; N: No; ?: no data; UD-: University Department

Appendix I: Research and Interview Questions Correlation

Table 8. Data Matrix

RESEARCH QUESTION	INTERVIEW QUESTION NUMBER
I. What are the concerns in U.S. universities due to IT/IS offshore outsourcing, in relation to interest and enrolment by students in IT/IS programs?	1, 2, 3, 6, 10, 11, 12, 13, 14
II. What are the prevailing consequences of IT/IS offshore outsourcing on undergraduate training for IT/IS programs?	4, 9, 15, 16
III. What are the specific changes in IT/IS university programs that can be attributed to IT/IS offshore outsourcing?	5, 7, 8

The explanation of the correlation between the research questions and interview questions follows below. It is based on content expert advice and also the literature research. The flow and numbering of questions does not logically follow the layout of the three research questions; I, II and III.

Research question I) addresses concerns by IT/IS college administrators in universities due to offshore outsourcing. These concerns are expressed as views or perspectives in question 1, reduced student enrolment numbers or interest in IT/IS college programs question 2, the perceived rating level on offshoring as a problem questions 3/6, the role and attention in academic professional organizations question 10/11, attitude concerning offshore outsourcing whether it is favorably or unfavorably rated; questions 12 /13 / 14.

Research question II seeks information suggesting that IT/IS Offshoring is a problem, being a problem it therefore stimulates certain consequences within the IT/IS college programs. These are reflected in the responses to effects within the college programs question 4, solicitation with state or federal authorities question 9, the hiring rates of graduating students question 15 / 16.

Research question III seeks to elicit information on the changes that IT/IS college departments have instituted to address the consequences and concerns of offshore outsourcing. This is reflected in observed direct effects or intervention measures within the IT/IS college programs question 5, specific steps can be outlined on the interventions taken question 7, and college collaboration or involvement with IT/IS firms that outsource job positions to overseas nations question 8.

It is also important to note that the qualitative research style that is being used in this study uses logic in practice; which Neuman (2003c) defines as being relatively

ambiguous, based on judgment calls and has a few sets of rules. He continues to say that logic in practice is subject to modification for further refinement of the survey instrument even as the data collection process is conducted. New information gets revealed by the respondents due to the open ended nature of the interviews. As this new information is discovered, it can be incorporated into the research process by refining the survey instrument.

Appendix J: IRB Approval**MEMORANDUM****To:** Martin Bagaya


Signature

From: James Cannady, Ph.D.
Institutional Review Board**Date:** August 15, 2006**Re:** *IT/IS Offshore Outsourcing: Educator and Student Perspectives***IRB Approval Number:** cannady08150603

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

- 1) **CONSENT:** If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.
- 2) **ADVERSE REACTIONS:** The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2085 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in

the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File
Office of Grants and Contracts (if study is funded)

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Appendix K: The Innovation Technology Architect

The job description of an InTA is recommended as follows:

- Develop a program to promote the recruitment, retention of IT/IS student talent, including math, science and engineering programs
- Promote and identify the hiring opportunities of graduates in the science, technology and engineering careers.
- Work with IT Industry, congress, state and federal government, professional organizations to solicit for funding and support for IT/IS career activities
- Investigate and identify opportunities provided by offshore outsourcing activities, including research on trends, weaknesses and statistics
- Conduct direct science and technology promotional activities at the university, in schools including competitions, lecture series, media presentations and sensitization seminars
- Identify and define innovative projects that can be passed on to the college departments for consideration and development
- Help administrators define and set recruitment goals for science, technology and engineering programs
- Evaluate performance of the recruitment goals and objectives in science, technology and engineering programs
- Help formulate guidelines and coordinate activities for an Industry Advisory board
- Participate in the curriculum development for the IT/IS careers
- Budget, plan and implement all the activities specified above and any duties assigned by the University President
- Make quarterly reports to the university president of any activities and progress in this job position
- Conduct regular evaluation and monitoring of the project assignments referred to above

Appendix L: Government Offshore Outsourcing Friendly Legislation

The lack of information, or research relating to offshored IT/IS jobs was a prevalent theme. Government can and has the ability to provide a solution to this problem. The kind of legislation similar to that arising out of the Enron scandal, the Sarbanes Oxley laws is a possible remedy. These would be called the offshore outsourcing and higher education laws (or any other appropriate title): The apportioning of this level of significance is based on the fact that if the consequences of offshore outsourcing are left un-checked, it may be a threat to National Security or the U.S. economy and its global competitiveness drive. The sections of the law would be like what is given here below:

1. Firms shipping offshore jobs, or opening subsidiaries are required by this law, to report all such activity, the kind of operations, the number of jobs, destination country location, and designations of job titles. The corresponding number of planned employees for hire will be disclosed to the department of labor and statistics and the National Innovation and Education Council (NIEC). Regular reporting and updates or changes in the said operations are by law required to be furnished on a quarterly basis.
2. The National Innovation and Education Council (NIEC) is instituted with this legislation. This council will be composed of 10 members from institutions of higher education learning (or Innovation Technology Architects – positions funded by government), a minimum of 5 rotating representatives of the IT industry executives (at the minimum rank of CTO, CIO), 2 ranking members from the National Center for Education Statistics, 2 ranking members from the Bureau of Labor and Statistics, 2 ranking members from the department of Homeland security, 2 ranking members from the FBI.
3. It is not against this law to offshore jobs to overseas destination countries except with the requirement that such jobs are fully disclosed, and the objectives of such deployments warrants such action, or alternatives in the U.S. are deemed reasonably implausible. Reasonably implausible can include I) search for expanded markets overseas II) a justification that the local resources cannot satisfy the demand or III) The economic costs and advantages of such an implementation overseas far outweigh the benefits of conducting such operations and functions in the U.S. An independent evaluation to justify such a claim shall be conducted and be approved by the NIEC within 1-year, and a response to such a request will not take less than 6-months to complete. The whole process should not exceed a 2 years period to implement, or the Company may be exempt from this condition III. IV) Re-investment in the U.S. of the profits from such an offshore activity will not be less than 50%, (calculated as a percent of the Net Profit). Or alternative jobs in the U.S. will result, and the minimum of such created jobs will be 25% of the number created overseas. The 50% profits can alternatively be donated to science technology and math programs in U.S. universities for conducting research and development. Not more than 20% can be directly used as grants to students with talent for tuition payment.
4. The kind of job activities that relate to a Company's intellectual property and is construed to be a threat for a firms competitiveness or a threat to national and/or

economic security may not be offshored. The CIA, and DHS will assist the NIEC in determining what qualifies under this clause.

5. Information collected and compiled by the National Innovation and Education Council will be made readily available and accessible to all high education institutions, high schools and with online unrestricted access.
6. Non compliance to article 1 of this legislation is punishable with a reduction of 50% H1B slots such a company is assigned in the next period following H1B visa allocations, and over a period of not less than 5 years but not exceeding 10 years. For the company found to act in violation of this law but does not have effective H1B visa slots due, alternative punitive measures are deemed necessary in lieu of H1B visa slots, a monetary cash equivalent in the amount totaling up to the sum of salaries of U.S. paid equivalent job positions created overseas for a period of not less 5 years and up to 10 years' salary will be imposed. The salary amount will be the average salary equivalent of an American IT worker hired in the work location within the U.S. and responsible for similar or same work activities. Where difficulty in establishing such a pay rate exists, the amount will be a salary of a systems Analyst based on a location of the IT Company's headquarters in the U.S.

Note: This kind of legislation will not ban offshore outsourcing. It also uses a carrot and stick approach to the companies interested in offshoring. What it does is legally authorize it where the economic advantages are justifiable, but also beneficial for the U.S. economy. It ensures that atleast 50% of the profits coming from this adventure are plowed back into investments in the U.S. economy or the U.S. education and research establishment. However, at a minimum it restricts "indiscriminate offshoring", or "offshoring at a whim". It makes firms planning to offshore think before going all the way to implement their plans. The process enables open information exchange, which is available to universities. It also protects the country from offshoring in areas that can adversely affect national security and the economy by offshore vendors. It helps provide a cure to the data inadequacy on offshoring and limit un-informed or exaggerated media explosions.

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