

Offshore Outsourcing Drives Curriculum

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Introduction

Introduction to Application Development was completely reworked. Less emphasis was placed on programming and more emphasis on developing and communicating user requirements. Many items used in training industry were incorporated into the CPT 180 course. The paper will detail the change in focus in this course and overall how our curriculum is being transformed.

In this paper I would like to take a look at offshore outsourcing and the effect it has on curriculum in higher education. I will review offshore outsourcing's history and trends that will play a role in shaping our curriculum in years to come. Specifically, I will look at our CPT 180 Introduction to System Development course and review the changes we've made in the last year. I'll discuss how they reflect the skill set that will be needed in the IT world in the years ahead. I will also take a look at our curriculum as a whole and how it may change in the future.

Offshore Outsourcing Overview

Offshore outsourcing has been extremely visible in the last several years with an economy that has slowed after the boom of the 1990s and the well publicized loss of high paid white-collar jobs. Last year's presidential election only added to the publicity as candidates made the topic a subject for debate throughout 2004. What is meant by offshore outsourcing? According to Centipedia.com, offshore outsourcing can be defined as:

“The practice of hiring an external organization to perform some or all business functions in a country other than where the product will be sold or consumed. It can be contrasted with offshoring, in which the functions are performed by a foreign subsidiary of the parent company”

Even though there has been a raised awareness about offshore outsourcing in the last several years it is not new to the United States. Outsourcing has a long history in the United States dating back hundreds of years when the making of covered wagon covers was outsourced to Scotland. In the 1970s accounting, payroll and word processing were outsourced, generally only as far as another state. It wasn't until late 1980s and early 1990s that offshoring started taking off (Kelly).

According to Centipedia.com jobs that are offshore-able include some of the following traits:

- Don't require customer interaction
- Can be teleworked
- Has high information content
- High wage difference between original and offshore country
- Work is repeatable

Looking at the list, it is apparent many jobs in IT are "offshore-able" candidates. The big impetus for US companies to offshore outsource is the cost savings. In the aftermath of 9/11 and the recession, companies have been looking at ways to help their bottom line. With computer networks stretching to the farthest reaches of the world, it truly is a global economy. IT is an area where costs can be cut. In 2003 the average salary of an Information Technology worker was \$8,593 in India compared to \$80,286 in the United States (Niederman 2004). India is producing over three million college graduates a year which continues growing.

Trends

Sources such as Gartner and Forrester Research take somewhat different views from the United States Labor Department on the number of jobs lost and anticipated losses in the years to come. A 2004 Labor Department study states that very few job losses in the United States can be blamed on outsourcing. They found less than 2% of the jobs lost in the first quarter of 2004 could be attributed to outsourcing with the hardest hit areas being the Midwest and South. There is some evidence to support that the data was flawed according to experts interviewed in the Washington Post and Wall Street Journal. They site a small sample size and the inclusion of larger companies that laid off 50 or more workers as contributing to the inaccuracy (Webb 2004). Data from Forrester Research estimates 400,000 jobs had moved abroad by 2003 and forecast that number would hit over three million in the next ten years. The debate continues as to the magnitude of offshore outsourcing, who wins and loses, and the long term effect to the American economy. We know that it is not likely to go away in the near future.

In presenting my paper "A Follow up: Developing Growing Need for Soft-Skills in IT Professionals" at the 2004 ASCUE Conference I posed the question about declining enrollments in computer programs. Only one person in attendance said their program was increasing their enrollments. Numbers in our Computer Technology Program (CPT) at the Columbus campus have declined 25-30% over the last several years. Although, these are not scientific studies, a recent study published indicated the number of declared majors was down 23% in the 2002-2003 school year (Schoenberger 2004). This has not escaped industry leaders such as Bill Gates at Microsoft. In February 2004, Gates toured some of the more prestigious universities in the area of computers and technology in an effort to generate interest in computer programs. In a telling interview during the tour Gates mentioned several reasons he felt enrollment was declining, including the fact that he believes the industry doesn't do a good job pointing out that IT jobs are very social, involving collaboration, project management and are not always the hard-core coding stereotype (Ricciuti 2004). In a recent Computer World survey of IT professionals only 19% felt colleges and universities were preparing students for the IT jobs of today and 15% believe colleges and universities are preparing students for the IT jobs in the near future. In that survey the most needed skills included communication/people skills, business skills, hands-on experience and project management (Hoffman 2003). In my paper I presented last year I detailed a pro-

gram that Purdue University developed for Cummins Inc. a Fortune 500 company. The program was in response to a desire to retool some of Cummins' existing IT staff that was being displaced by outsourcing. Instead of programmers, Cummins wanted to retrain employees and place them in positions as Business Analysts. Many of the skills lacking in the aforementioned survey were the skills that Cummins requested we include in the training program.

In order for programs to survive they cannot ignore offshore outsourcing. It is apparent this trend will not go away at least in the near future. If we look at industry as one of our customers we need to provide a product that they will want to buy. Based on some of the items I've just presented, it appears in some cases we are not always doing that. As Bill Gates noted, we need to look at selling the social aspect of it when selling programs to potential students and develop those skills for industry. I would like to discuss what we have done in one of the introductory classes in our program which I believe is on the right track.

Curriculum Changes

First a little background. Our program is in Purdue University's College of Technology. The Computer Technology (CPT) program's goal is to prepare students for careers in the application of information systems. Students can focus in several areas, including networking, database, systems analysis and programming. Our program is not Computer Science or part of a Business program. Part of our department's mission is to engage and develop partnerships with business, industry, and government. These groups are important for our survival and we try to work with them to supply their needs.

Our CPT program assumes that students come in with basic computer skills that consist of using the operating system, word processor, etc. In the first semester our students take a CPT 180 Introduction to Systems Development. This class was offered for the first time in the Fall 2004 semester. It was revamped from the previous class CPT 172 Introduction to Application Development. Over my ten years with Purdue University this course has gone through numerous changes but has typically focused on programming whether it be in Microsoft Access or using straight SQL. The course description for the old course was:

CPT 172 Introduction to Application Development - This course introduces the development of information systems through the use of a database. Topics include business information systems, system and application development, database management systems, problem solving, logic, data types, and programming using database technology. Given a database design and application requirements, students design, construct, and test a personal computer information system.

The CPT 172 class was definitely focused on the programming side. Looking at the topics of the nine labs assigned in the Spring 2004 offering you see the emphasis of the lab portion of the class:

- Lab 1 Create a database
- Lab 2 Query a database
- Lab 3 Maintain a database
- Lab 4 Create Forms and Reports

- Lab 5 Create a subforms
- Lab 6 Create switchboards
- Lab 7 Web features and integrating with other products
- Lab 8 Introduction to SQL
- Lab 9 Additional SQL

In the lecture portion of the class a variety of topics were discussed such as:

- Introduction to information systems
- Technology foundations
- Networks
- Security
- Transaction processing systems
- Decision Support and Expert Systems
- Database management
- System Development Life Cycle
- Context data flow diagrams
- Entity relationship diagrams

A common complaint among students was that there was a disconnect between the lecture and lab section of the course. Many students perceived the course as Microsoft Access class. When reworking the class faculty members tried to make the class more integrated and have less emphasis on the programming.

The new class CPT 180 Introduction to Systems Development has the following course description:

CPT 180 Introduction to Systems Development - This course introduces information systems development. Topics include types of information systems, system development, database management systems, and problem solving. Students will read/create UML, ERD, and data flow diagrams to model information system objects, data, processes, and logic. Labs emphasize modeling and SQL/QBE querying to prepare students for later systems, programming, and database classes. Given user requirements students will design, construct, and test a personal computer information system.

Although the course descriptions are still somewhat similar there definitely was a difference in focus. Looking at the topics of the labs assigned in the Fall 2004 offering you a much wider emphasis in the lab portion of the class:

- Lab 1 Introduction to Information System Concepts
- Lab 2 Context System Modeling
- Lab 3 Deployment Diagrams
- Lab 4 Use Cases and Activity Diagrams
- Lab 5 UML and Class Diagrams
- Lab 6 Data Attribute Discovery and Modeling
- Lab 7 Entity Relationships and ERDs
- Lab 8 Database Design
- Lab 9 Single table SQL query

- Lab 10 Query by Example
- Lab 11 Designing Forms
- Lab 12 Designing Reports

In the lecture portion of the class a variety of topics were discussed but there was a much more concerted effort to align lectures with lab topics. Some of the topics discussed in the lectures included:

- System planning and information system architecture
- System development methodologies and tools
- Determining user requirements
- Object-oriented analysis and design
- Data concepts and conceptual data modeling
- Designing databases
- Process modeling
- From analysis to design
- Output design and prototyping
- Implementation and support

What you see when you look at the content is much more variety in the course. In the CPT 172 course all nine of the labs dealt with some form of programming or working with Microsoft Access. As the students said the lab portion was truly an “Access” class. Comparing that with CPT 180 only four of the twelve labs could be classified that way and even in several of those labs the topics of prototyping and design of reports and forms was incorporated. Although the students come out of the lab portion with emphasis on programming they are getting a much wider use in skills that will be useful in communicating with users and developers. The topics of Use Case, UML, Activity Diagrams, Class Diagrams and the Context Data Flow Diagrams along with Entity Relationship Diagrams exposes the students to a wide variety of tools. We don’t expect mastery of all these but the exposure will be beneficial in the upper level classes our majors will encounter later in their academic careers. In the lecture portion of the class you see the same approach with a much more integrated lab and lecture.

The general consensus among faculty and students was that the class was a success. At the end of the semester faculty members for the main campus and four regional campuses met to discuss the class. There were minor problems but the overall feeling was the class was an improvement over the old course and we were heading in the right direction. The major problem was trying to find a suitable textbook with minor issues as to sequencing content and trying to fit the topics in to the allotted time. Students seemed to be satisfied with the class although a few wanted write more code. The major complaints was that the textbook was too difficult and the software used Microsoft Visio which couldn’t be bought with there student discount so they were forced to do their labs in university labs.

There is another advantage to the content change in our CPT 180 course. This course acts as a service course at the university. Undecided students and students in other majors will regularly take this course. A common complaint in the past was that these students didn’t want to do the programming. With the change we are exposing additional students to our change in focus, hopefully exposing students to the fact that the communication skills are important in an IT career and

that it is not just for “geeks”. In the past we have had students who would take the introductory class and decide to switch to our major. This new class will hopefully shed a more positive light on our degree and potentially lead to recruiting a few more students in the form of transfers.

Link to Outsourcing Needs

If you compare the CPT 180 content with content of the course we developed for Cummins and detailed in last year’s paper you will notice a striking similarity. Following are the main topics covered in that course:

- The Context of Systems Analysis and Design Method
- Information Systems Building Blocks
- Communicating with the Systems Team
- Team Building with the Systems Team
- Information Systems Development
- Project Management
- Systems Analysis
- Fact-Finding Techniques for Requirements Gathering
- Modeling Systems Requirements
- Data Modeling and Requirements
- Process Modeling
- Feasibility Analysis and the System Proposal
- Object-Oriented Analysis and the Modeling using the UML
- Database Design

And, as I mentioned in last years paper, communication and team building was integrated throughout all of the topics discussed so it played a major role in the class. This curriculum was developed by Purdue faculty working with Cummins training coordinator, Cummins IT managers, developers, analysts and Cummins offshore contractors. The goal was to retool the Cummins workers to make offshore outsourcing a success. The course was designed for employees who had careers as Programmers and would be transitioning over to Business Analyst positions. At this time we have delivered five sessions with over 10% of Cummins worldwide IT staff having taken the course with very positive remarks coming back from attendees, offshore outsourcers and management.

Overall Curriculum Trends Based on Outsourcing

From the National Workforce for Emerging Technologies (NWCET) in their Executive Summary of Trends Assessment 2005 they list some interesting trends:

- Seven of the thirty fastest growing occupations are computer related
- Jobs will require IT professionals to focus the applications (healthcare, finance, commerce, etc) rather than the technology
- IT employees will need to be cross-disciplinary
- Outsourcing and a tighter job market will allow companies to look for more work experience, and higher levels of education.

Also, in the NWCET Trends Assessment 2005 they recommend existing IT programs at universities to:

- Offer advanced programs and baccalaureate degrees
- Emphasize applications in IT programs
- Include practical experience and internships
- Integrate soft skills and technical skills into the curriculum
- Integrate collaborative work skills into the curriculum

It appears that IT jobs are not going away but the boom that our programs experienced in the past is gone, at least for the time being. In order to make our students employable we need to get students work experience, incorporate more soft-skills, include more application areas to give students a niche and offer advanced degrees in an attempt to differentiate our students.

CPT Changes

The vision of the Computer Technology Department is to be recognized as a leader of information systems and technology education. In this attempt we find that the curriculum is ever-changing and we are continually looking for ways to improve our product. In this effort there have been several changes or suggested changes to our curriculum at Purdue University. Several of these are in line with NWCET Trends Assessment 2005. Included are:

Until this past year, students chose one of four tracks to focus in: networking, database, systems analysis, or programming and their junior and senior level classes were predominately in that area. This past year database, systems analysis and programming were combined. This gives students a better opportunity to pick and choose classes to fit their interests and scheduling needs.

Another change is that in the past the main campus at West Lafayette and the regional campus in Columbus were the only sites to offer the baccalaureate degree in CPT, with South Bend, Anderson and Kokomo offering the associates degree. The department has made the decision that all sites should seek approval to offer the BS degree effectively eliminating direct competition with the community college system in an effort to differentiate ourselves and students. This past spring the Kokomo campus was granted permission to offer the BS program.

Several recent hires/job postings in CPT indicate a desire to find niche application area experience with healthcare and computer forensics as part of the work experience mentioned in the job descriptions.

Several suggestions that were brought up in recent meetings but have not had any action taken on them as of yet include:

- Having a Master program in Computer Technology, currently students can get a MS in Technology but not specifically in CPT.
- Doing more with internships

Conclusions

With the IT workforce being affected by offshore outsourcing in a negative way it is inevitable that the university programs like our CPT programs will be affected. The university needs to be a source for supplying industry the needs for an ever-changing workforce. We need to provide students with the skills that will allow them to get jobs in their chosen career path. This will inevitably lead to constantly tweaking the curriculum. In this paper I have discussed one small effort on our part to change an individual class. These changes reflect the changing landscape influenced by the recent emphasis on offshore outsourcing. The effort is to introduce students to those skills, mainly skills to communicate with users and programmers as opposed to our previous class that had heavy emphasis on programming, specifically one of the skills being outsourced. It is too early to tell how successful we will be, but early indications are we are moving in the right direction.

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