The Pedagogical Value of “Eduployment”: Information Technology Internships in Rural Areas

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ABSTRACT
Providing internships for Information Technology students represents a significant issue to institutions of higher education located in rural areas where few if any organizations exist with sufficient resources to support such programs within a manageable transportation distance. This paper documents our experiences with an approach we refer to as “Eduployment” a program designed to address in part the rural internship problem.

In this paper we describe the planning, development, structure, implementation, and experiences with a faculty/student managed, University aligned, grant supported, Information Technology consulting firm’s first two years of operation, evaluating effectiveness from the educator and student perspectives.

This program contributed to changes in our Information Technology internship program, provided employment for students, and positively influenced many projects and assignments in the Information Technology program’s courseware.

With the changes we have observed, that students are better prepared for employment, understand the importance of customer service, meeting deadlines, time management, and working in teams. Thus far, all student graduates involved in the program have secured employment; moreover, 90% of the students stated that the Eduployment program was of value and prepared them for employment.

Categories and Subject Descriptors
K 3.2 [Computer and Information Science Education]: Industry-Education Relationships, Student Research/Capstones/Internships, and Education – Experience Report

General Terms
Management, Experimentation

Keywords
Information Technology Internships, Information Technology Consulting, Startups, Survey

1. INTRODUCTION
Internships offer Information Technology students valuable practical work experience, insight into IT operations, team and reporting relationships, and important career networking opportunities.

However, facilitating internships for Information Technology students represents a significant issue to institutions of higher education located in rural areas where few if any organizations exist with sufficient resources to support such programs within a manageable transportation distance. For example, in cases where the college/university is located in a rural agricultural area, there may be little opportunity outside of the college/university itself to provide internships. In addition, as the practice of off-shoring expands, sending more Information Technology jobs overseas, it is reasonable to conclude that there will be less interest in providing internships by companies and other organizations that have the resources. Why support a robust domestic internship program, if the Information Technology jobs are to be developed overseas.

Internships provide students with practical work experience that cannot be fully simulated in the classroom, students gain an understanding of employment in the discipline, preparing them for the rigors of a daily work environment, and allowing them to become acquainted with reporting relationships in an organization.

The ACM SIGITE group, in their ground breaking Information Technology Computing Curricula Guide [4], stresses the importance and pervasiveness of industry-based and classroom based experiential learning. Moreover, research [1] suggests that student internships are a means of developing a feeling of self-efficacy within the student which can lead to a more productive career.

For businesses, internships are often a major part of their recruitment process, a way to market their organization to prospective labor force, and perhaps most importantly internships are an example of “try before you buy” form of prospective employee evaluation. In addition, the feedback a student receives from the partnering business or organization can help students secure employment after graduation and improve their effectiveness as employees. This type of feedback combined with the use of a skills inventory can help students, mentors, and faculty assess the capabilities of the intern and guide further instruction and certification learning [3].

Prior to 2007, the only computer related program our University offered was a Management Information Systems (MIS) major in the portfolio of programs provided by the Business Division. Our assignment was to construct, build, and grow an Information
Technology program derived from the ACM’s Information Technology 2005 curriculum guidelines. Since we were a startup program, no relationships with external organizations had been established, thus, we were on our own to explore establishing relationships and/or other alternatives.

Although there are realistically several potential approaches to addressing this issue, after exploring the development of the traditional business relationship approach, it became clear that the feasible opportunities were limited in the area. The rural location, miles from an organization needing and capable of supporting paid internships presented a significant challenge.

As a result, our solution was to establish and operate a project based not-for-profit Information Technology consulting firm primarily to employ, as a substitute for external internships. Information Technology, Management, and Marketing majors; however, other disciplines were also considered potential candidates for Eduployment positions. To augment our academic instruction, whenever possible, we leveraged the training and experience derived from the Eduployment enterprise, including these experiences in our Information Technology classroom discussions.

Creating the organization required the development of an entrepreneurial organic corporation, independent yet aligned with the University, an effective management structure, and well-defined business processes that utilize faculty, students and some graduates as the management and labor force. However, unlike the predominately student controlled business model proposed in [5] a combination of faculty, graduates, and experienced senior students would assume C level officer and Chief Architect roles.

The strategic plan for the organization targeted IT services within the University as well as focused on local and potentially regional market segments underserved by existing IT services.

Since students gain valuable industry experience as a tradeoff for higher wages, the lower labor costs, supplemented by potential grant funds, enable the Eduployment firm to target small rural businesses and other not-for-profit organizations, which could neither afford to establish their own IT organizations nor web sites. Paper [6] in its discussion of the benefits to industry, discusses how “little or no capital investment” is needed. Thus the focus is servicing a market untouched by professional IT consulting firms. Moreover, if firms are employing outsourced services to access a lower cost labor market, the Eduployment firm can compete based on price on a limited scale in this market space. Brian Janz, et.al., [1] discuss using student labor for “onshoring” with an external consulting firm in contrast to our internal firm.

Section 2 describes the business plan, strategy, and organizational structure. Section 3 reviews faculty experiences, learning outcomes and value assessments. Section 4 presents and evaluates the student survey and feedback. And finally, section 5 provides our summary and conclusions.

2. BUSINESS PLAN AND STRUCTURE

Since this is an experience paper, we outline our approach to constructing and organizing this enterprise. In order to sell the Eduployment concept to others, a business plan was developed to describe the concept, nature, vision, mission, objectives, services, market, organization structure, strategy, and financials. From the business plan document, a presentation was created to describe the concepts to the University administration, local political leaders, other faculty, and students.

To sell the plan, we adapted the base presentation to the interests of each constituency. For example, administration officials are interested in the overall benefits to the University and community, marketing benefits, and costs; political leaders value community benefits to local businesses and the labor force; faculty are focused on the pedagogical value and faculty involvement requirements; and finally, students are interested in how Eduployment could help them with their careers.

The business plan needs to clearly state, why the proposed organization is of value, how it will be implemented, and how much it will cost.

2.1 MISSION OBJECTIVES AND GOALS

The mission statement communicates what we are, what we intend to do, and summarizes our operating guidelines. We used the following mission statement:

*To provide quality Information Technology business information solutions, reliable and professional Technical Support, and unparalleled Customer Service through the application of ITIL best practices and principles of Quality Service Management, to provide our customers with rates that are competitive with off-shoring using student labor, and to embrace sound and ethical business practices.*

The organizational objectives we used are as follows:

- The Eduployment organization is created as an extension to Information Technology educational program designed to enhance the learning outcomes and employability of our students.
- The organization must provide a benefit to the University and community by further developing a skilled labor force that is capable of providing information technology services to select University, business, and not-for-profit clients.
- The organization should offer an alternative to outsourcing overseas or “off-shoring” by offering competitive labor costs, enabling increased usage of Information Technology in the local economy, and reducing “brain drain” by developing and retaining skilled information technologists in the area, an important issue for many rural communities.

Goals describe specific measurements to be accomplished within an identified time horizon. We selected the following initial goals:

- Complete a minimum of 6 information technology projects in our first year of operation.
- Develop and execute a marketing plan to communicate the nature of the Eduployment organization and the value of e-commerce to local and regional business.
- Complete a minimum of two grant applications to help fund pro-bono work.
- Return a minimum of 5% of generated revenue to the IT scholarship fund.

2.2 INITIAL SERVICES

We proposed the following initial services: web site development, legacy system migration and conversion, information technology infrastructure implementation and project management, information technology research, training, and PC repair. See Table 1 below for the list of services and classifications based upon complexity.
2.3 MARKET ANALYSIS

The market analysis describes the targeted area and customers. We specifically targeted rural small businesses and not-for-profit organizations without resources and expertise to exploit information technology. In addition, we made services available to university students such as PC repair and malware removal.

As far as being an alternative to off-shoring, our capabilities limited us to small web development and programming projects. Off-shoring, while beneficial in some cases [2], has resulted in the loss of thousands of American jobs to overseas outsourcers as companies seek to lower labor costs. Our concern is that the benefits will diminish over time, as living standards improve overseas. When the inevitable cost increases occur, businesses will have no choice, but to continue with the off-shore provider since it may take years for the American technology labor force to recover sufficiently to compete.

Beyond the issue raised above, community leaders in rural areas are acutely aware of the problems caused by “brain-drain” and the resultant job loss to the area. Due to the lack of technology jobs in rural areas, frequently the best students relocate to the cities to pursue their careers. Nevertheless, life in rural areas does have its benefits; rural areas can provide a low stress quality of life and a lower cost of living. The strategy is therefore to combine the lower cost of living, the not-for-profit status of the organization, and reduced student labor costs to be price competitive.

To highlight and summarize this concept, promoting in-shoring support for American workers and assisting our nation’s students, we developed a tagline and included it in our marketing materials to help motivate our students and generate support for the initiative. The tagline we used is as follows:

*For America and its students, don’t go overseas, heartland.*

The message is simple – businesses help America, help students, don’t go overseas with your business, and keep your business here in the heartland of America.

2.4 ORGANIZATIONAL STRUCTURE

We designed the organization to be relatively flat, functioning with four distinct levels: Chief Executive Officer/Chief Information Officer (CEO/CIO), Chief Operations Officer (COO), Chief Architects, and Consultants, operating as an independent subsidiary of the University, reporting to the Vice President of External Affairs (VPEA). The CEO/CIO position was staffed by faculty while students and/or graduates filled the lower three levels. We cannot overemphasize the importance of the COO position and hiring the correct person for the position. The COO is responsible for operations, marketing, human resources, time accounting, and overall project management and is the only position paid hourly; the other consultants and architects earn compensation by project. We recommend a student majoring in Information Technology with a minor in Business Management for the COO position. We were fortunate to recruit a non-traditional student for this role who had business management experience.

Faculty members, functioning as the CEO/CIO, were required to, in collaboration with the COO, design, develop, and document the organizational structure, education plan, policies, standards, and processes. We required daily updates on project status, weekly face-to-face meetings, and monthly employee recognition meetings. It is important to emphasize the consistent use of properly documented, client engagement processes, project plans, meeting project deadlines, quality standards, and project change management processes. Students need to learn the value of controlling the change, testing, and deployment process, without which, failure is almost assured. Unless properly instructed, students will generally apply changes directly to production systems. Assigning faculty members with business experience to leadership roles, allowed us to leverage this experience to educate students on the nature of work life in the Information Technology field, stressing the importance of teamwork, being on time, having a strong work ethic, developing quality solutions, following development guidelines/standards, meeting deadlines, professionalism, dress codes, and the importance of customer service. For compensation, faculty can draw from project overhead expenses, or receive overload pay.

Another key to success is student recruitment. Upper division students with the majority of their information technology courseware completed are better positioned to contribute to and benefit from the organization. Each consultant, upon hire, receives an educational plan / skills inventory that is used as a guide to schedule the consultant for specific projects. For example, if the student has completed course work in Web Development, the student consultant can be scheduled for a web development project; students that have completed course work in project management are eligible for project management assignments, etc. Consultants were encouraged to complete self-study courses to improve their skill levels and thereby become eligible for a larger set of projects; however, they were not paid for self-study, although this form of learning was strongly encouraged.

Each consultant was given a polo shirt with the company logo, a set of business cards, and instructed as far as organizational processes and policies during orientation. The business cards and polo shirt served to provide a certain distinction to students in the

**Table 1: List of Services**

<table>
<thead>
<tr>
<th>Service</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Development Services</td>
<td>Create, test, deploy, and turnover to the client.</td>
<td>Create, test, deploy, host, and maintain the site.</td>
</tr>
<tr>
<td>Legacy System Migration and Application Conversion</td>
<td>Migrate an application from an existing platform to a more modern and cost effective platform.</td>
<td>Convert existing application source code from a legacy language such as Cobol to Java, or C++.</td>
</tr>
<tr>
<td>Information Technology Infrastructure Implementation and project management</td>
<td>Plan, manage, and implement a project to setup a network infrastructure.</td>
<td>Use ITIL best practices to establish infrastructure.</td>
</tr>
<tr>
<td>Information Technology Research</td>
<td>Plan and manage a research project to identify IT solutions for a client.</td>
<td>Complete research and implementation project.</td>
</tr>
<tr>
<td>Information Technology Training</td>
<td>Provide one time training courses to clients for common office applications.</td>
<td>Provide ongoing training courses to clients for common office applications.</td>
</tr>
<tr>
<td>PC Repair</td>
<td>Hardware software installations.</td>
<td>Malware removal.</td>
</tr>
</tbody>
</table>
organization, recognizing them as part of the team and encouraging others to aspire to join the organization. The small investment in business cards, impressed many students, enhancing their self image and professionalism.

As the organization evolved, student consultants were required to maintain a B average their courseware. In the event a student’s GPA fell below 3.00 for a term, they became ineligible to work on projects for the following term or until the minimum grade performance target was equalled or exceeded.

3. FACULTY EXPERIENCE

To sell the plan, we first received input from our department chair and approval to proceed to communicate the plan to the administration. In addition, we worked with our grant writing department to seek some startup funding. Since our computing department consisted of two faculty members, it was a fairly straightforward to develop the business plan, grant proposal, and presentation. We next scheduled a meeting with our Vice President of External Affairs (VPEA) to obtain his input (both positive and negative) regarding the plan and incorporated the VPEA’s thoughts into the presentation and plan. This sequence was followed by a presentation to the president of the University. Be prepared to show a detail budget, a projected income statement over 3–5 years with and without external grant funding, and list space and utility requirements for the organization if the plan is to locate the organization with in the University. We were fortunate that our Eduployment initiative was aligned with a separate University program to assist local businesses so the VPEA and president readily approved the initiative. We were also fortunate to receive external grant funding enabling us to begin operations sooner and with a larger number of consultants on board; however, in our opinion, external is not an absolute requirement.

Marketing services: Upon receiving approval, a web site and document describing the mission and services provided by the Eduployment organization was developed from information included in the business plan. Our initial announcements consisted of a campus wide internal communication, and an externally directed University press release, describing the existence of the organization and services provided. We also joined local commerce groups and provided presentations when requested to their meeting attendees. We compiled a listing of local small businesses and not-for-profit organizations, prioritized some top candidate customers, and arranged a visit to start developing a potential relationship. Our goal was to complete 6 projects in the first year; however, by the end of the first year there were 39 major projects either complete or in process.

Operations: Working with student consultants presents several interesting challenges. Since most students are unfamiliar with how effective businesses operate, CIO/COO mentoring, process definition, and guidelines documentation are important tools used to convert raw student labor to an effective, organized, reliable, professional labor force – a significant challenge!

Contracts and waivers: It is highly recommended to develop customer contracts for web site development projects, web site maintenance, PC repairs, and other consulting work to document requirements and help avoid scope creep.

Organization-Communications: CIO/COO communications took place as needed, however, we found that at a minimum a weekly status/planning meeting was necessary to keep projects on track, prioritize work, and address issues. We scheduled monthly “all staff” meetings for announcing strategies, discussing progress, motivating employees, and recognizing achievements. Consultants that distinguished themselves, by meeting quality standards, project deadlines, and/or received positive customer feedback were awarded the “Jedi Knight” award for the month.

Documenting and communicating processes and guidelines is of critical importance, as the organization matured, the goal was to eventually document every repeating process. We documented and used the following processes and support information:

- Customer Engagement Process
- Marketing Process
- Hiring and other Human Resource processes
- Change management process
- Time accounting process
- PC repair process
- Web site development and implementation
- Server configurations

Deadlines and Scope: Not surprisingly, one of the greatest issues we faced concerned meeting project deadlines. The student experience involves many competing demands upon time, such that, many students find it difficult to effectively balance and prioritize their education, social, family, extracurricular, and work time. We of course emphasize that their education (classroom and study time) was to have priority over work; however, our students were required to choose Eduployment work over other obligations or not be eligible for project assignments. Moreover, students will often feel obligated to help customers without regard to project scope, and therefore, are hesitant to decline additional work requests beyond what was agreed by contract.

3.1 CUSTOMER EXPERIENCES

Comparing external and internal customers, internal campus customers were the most reasonable and forgiving of missed deadlines. Students that used the Eduployment organization services for PC repairs and malware removal seemed very relieved that an on campus service was available at a cost significantly below what they would find in their local consumer electronics store, typically less than $15/hr labor plus parts. PC repair and malware removal was very popular with our consultants due to the short turnaround time (in general) of the work effort, direct realization that you have helped a customer, and the satisfaction of working through and resolving a problem.

Although there were several internal web development projects, creating club web sites and personal sites for faculty and administrators proved to be the most suitable projects for the organization since they involve smaller less complex sites, are appropriate for template use, and more often than not, the content is readily available. However, the most significant internal project completed, combined Eduployment and capstone course work to research, plan, and implement a Help Center for the University.

We encountered far more problematic issues with external customer projects, but ultimately these issues resulted in valuable student learning experiences. While many small businesses and not-for-profits are interested in web sites supporting online transactions, few have the time, knowledge, financial resources, and the desire to commit to the development and maintenance of the site after is deployed regardless of the potential value. Conse-
quently, the Eduployment organization needs to encourage and be prepared to manage the site for the customer, as well as, provide training to improve the likelihood of success. In our experience, pro-bono customers will attempt to take advantage of student consultants and the organization by assuming all work after the deployment is free in perpetuity.

The students and organization encountered unethical customers and other issues, and in the final analysis, even though the customer may violate terms of the development contract they are aware that the Eduployment organization will most likely not use a legal recourse to enforce the terms of the agreement. Nevertheless, problematic customer encounters are of tremendous value to the Eduployment organization and the academic program. Given these issues, students learn the negative impact of scope creep and why it is never appropriate to deliver code until at least 90% of the contract fees are paid, regardless the relationship.

4. STUDENT FEEDBACK
After our first year of operation we surveyed our student consultants and management regarding the value of the experience with the objective being to improve the organization for current and future students. The survey consisted of 31 information gathering questions; the following summarizes the 6 most important questions.

Question 1: How valuable do you believe working for our Eduployment organization will be to you when you seek employment after graduation?

Of the surveyed consultants 40% rated their learning experiences as being very valuable. Beyond learning how an organization functions, how teams work, and working with customers, a common issue identified is that the organization’s focus was limited to web development, PC repair, and project management when students were interested in other aspects of Information Technology specializations. To address this issue, we planned to create additional services to manage our own hosting environment, video productions, and training.

Question 3: To what significance level have you been able to identify areas where you need to improve your knowledge level?

With regard to identifying knowledge deficiencies, only 30%, rated Eduployment as helping at the very significant level. As indicated, each consultant was given and required to maintain a personal skills inventory matrix enabling them to assess their knowledge level with regard to the organization’s services. To address this issue, we planned a special presentation to cover the purpose and usage of the skills inventory matrix.

Question 4: To what significance level have you learned about customer service?

One of our most important objectives with regard to Eduployment is to educate our consultants about the importance of customer service. While 80% indicate an above average rating or better, this area can be improved. To address this issue, we planned a special presentation to show a customer service training video.

Question 5: To what level has Eduployment helped you better understand the importance of business etiquette and professionalism i.e., showing up, responding to emails on a timely basis, and conducting oneself in a professional manner?
Another important objective is to educate our consultants about the importance of business etiquette and professionalism. While 90% indicate an above average rating or better, this area can be improved through additional education at our all-staff meetings or implementing a program similar to one described in paper [7].

**Question 6:** To what level has Eduployment helped you better understand the importance of delivering quality products, on time, and within budget?

In the final analysis, overall our experiences were positive and we believe the organization is working toward achieving its goals. Although Eduployment significantly increases the workload for the faculty involved in the program, it proved to be an excellent opportunity to help students better prepare for their careers.

**5. SUMMARY AND CONCLUSIONS**

Our objective in writing this paper is to share our experiences with regard to a student internship program we refer to as Eduployment.

1. Internships offer Information Technology students valuable practical work experience, insight into IT operations, team and reporting relationships, and important career networking opportunities.
2. However, facilitating internships for Information Technology students represents a significant issue to institutions of higher education located in rural areas where few if any organizations exist with sufficient resources to support such programs within a manageable transportation distance.
3. In order to address this issue, we formed a not-for-profit IT consulting firm, operated by faculty and students, designed to focus on providing IT services to small businesses, other not-for-profit organizations, to the campus faculty and students, and businesses considering off-shoring.
4. Overall, the implementation model used has been successful; however, in our experience the Eduployment approach increases faculty workload by as much 15-20%. Although we recommend, some form of overload compensation, additional compensation was not introduced in our program.
5. From a student perspective, over 60% gave the program the highest evaluation rating, and an additional 30% rated the Eduployment experience as above average value. Areas that need improvement include enhancing our education program with regard to the use of the skills matrix, customer service, and business etiquette.

**6. REFERENCES**


