Internships: Lessons learned beyond the classroom.

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1. Introduction

This paper describes ways in which our internship taught us to use project development models, learn new technology, and communicate our ideas effectively with management. We provide a list of ten guidelines to effectively communicate as interns and describe how businesses can benefit from internships.

Our internship, provided by Central Utah Water Conservancy District (CUWCD), has helped us apply our IT education, gain real-world IT experience, and learn to communicate with management. CUWCD hired us to produce a web-based application known as the Virtual Demonstration Garden (http://gardens.cuwcd.com). The Virtual Demonstration Garden was developed using PHP, CSS, HTML and JavaScript, and it is supported by a MYSQL database and an Apache web server. We developed an original idea to create a website that teaches water conservation principles. The site is also an online resource to help consumers find water-efficient plants that thrive in the state of Utah. Our internship taught us many lessons we feel every intern should learn.

2. Project development models.

An internship takes a student from a world of textbooks to a world of real application. In the educational realm, a frequent motivation for completing an assignment is to receive a good grade. In the business realm, the motivation changes from receiving a grade to producing a good product. School projects are often short and intended to give a student a small taste of the real world of IT. Business projects generally take much longer to produce, and are much more complicated. Business projects require the use of project development models. An internship is an ideal way for a student to be exposed to and use a project development model.

There are two common project development models: the Waterfall model and the Iterative Development model. The Waterfall model is a process wherein each step of a project is completely finished before moving on to the next step. The steps of the Waterfall model are: Definition of requirements, project design, code and unit testing, subsystem testing, and system testing. Most of the projects we have completed in school have followed a condensed version of the Waterfall model. This model works well for completing school assignments simply because it is a start-forward method and can be completed in the short time of a semester. The Iterative Development model is a pattern for developing a project using an iterative method. Every iteration has its own requirements of planning, definition of requirements, analysis and design, implementation, deployment, and evaluation. Each iteration results in an executable release of the program or project. The Iterative Development model differs from the Waterfall model in that

it allows the developer to redefine requirements and catch project errors throughout the entire development of each portion or release of the project. The Iterative process model adapts well to changes in requirements the end user is likely to request. The Iterative Development model is more frequently used in the business world than the Waterfall model. An internship can provide a student with experience and understanding of this model[1,2].

The creation of the Virtual Demonstration Garden website exposed us to the iterative development process. Since the project was an original idea, we had the unique opportunity to design, develop, implement, and manage the creation of the entire project. Central Utah Water Conservancy District viewed the project as a new approach to promoting water conservation even though at the time of approval, the requirements were not completely defined. Like most IT projects, user requirements were defined throughout the process of development. With each iteration of the project, a new portion of the website was completed. The development of the project required us to redefine requirements and redevelop different portions of the website to match user requirements and expectations. The use of the Iterative development model allowed us to learn as we developed. The Virtual Demonstration Garden project fully taught us how important it is to develop a project using a model that adapts well to change. We found the use of the Iterative model to be a wise choice as we constructed the new website[3].

3. The ten lessons we learned.

Internships teach students those principles that the classroom or textbook cannot. Experience in dealing with real-world IT projects is more than simply applying technical knowledge; it is learning to effectively communicate ideas. Our greatest challenge was not found in the implementation of technology, but in the presentation of technology. Learning to communicate well with management and others was one of the most fundamental lessons we learned as interns. From our experience we developed a list of ten guidelines for effectively communicating as interns:

1. Define very specific goals.
2. When discussing ideas with management, be general in technical descriptions.
3. Be realistic about how long a project will take to accomplish.
4. Keep management informed.
5. Do not overstep your bounds.
6. Document your work.
7. Work hard and be dependable.
8. Be a team player.
9. Be self-motivated.
10. Always look for ways to learn and improve.

3.1 Define very specific goals.
Every IT project must have a vision. The vision for the Virtual Demonstration Garden was to produce an online web application that provides resources that help the community create water-efficient landscapes. This vision was achieved through setting and completing very specific goals. Each goal was defined by user requirements, level of difficulty, and expected deadline. By

defining our goals in this manner, we were able to divide the workload between our two-person team. We assigned tasks according to our differing web development skills. As interns we learned about our limitations and strengths. Goals and tasks for each intern were created with his known limitations and strengths in mind. It is important that interns understands their limitations and strengths so that they can provide a business with honest effort and excellent work in a timely manner.

As we developed the Virtual Demonstration Garden, we found ourselves setting general overall goals and very specific individual goals. Management would give us general overall goals; however; to complete these goals very specific individual goals were set by each intern. This taught us the importance of focusing the vision of the project into our own specific goals. It also helped us break down the project into a portion that could be completed in a short amount of time. This made the project seem less overwhelming.

3.2 When discussing ideas with management, be general in technical descriptions.

A manager's time is very valuable. Managers are often very busy and do not have much time to sort through lengthy technical descriptions. They are more interested in knowing that interns know what they are doing and can be trusted with the work that has been given. A manager may be a person with extensive technical background or a person with little knowledge about computers. It is important to "know your audience" so that no one is left wondering what you were really trying to say. Diagrams are often a good way to portray a message in a simple fashion without making the project seem too technical or complicated. Progress reports are another way to be brief while informing management of ideas and project progress.

3.3 Be realistic about how long a project will take to accomplish.

When we started the Virtual Demonstration Garden project we had a "superhero mentality," which consisted of thinking we could complete a task a lot sooner than feasibly possible. After the first month of setting deadlines and not meeting those deadlines, we realized that we were not allotting ourselves enough time to learn new technology or to correct our errors. It is important to be realistic about deadlines. Project development is a discovery process for all who are involved. Management and interns must be careful not to fall into the superhero mentality. As a general rule of project development, tasks will generally take at least one-and-half to two times longer than originally estimated. If management and interns follow this rule, deadlines will be met and management and interns will be happy.

3.4 Keep management informed.

Communication is the key to the development of a successful project. There should be a bridge of communication between management and interns. The bridge for us was regular meetings and progress reports. The development of the Virtual Demonstration Garden was a combined effort of management, interns and others co-workers at CUWCD. Management met with us to define and redefine requirements. Co-worker's opinions where asked throughout the development of the

project to add differing views throughout the creation of the website. Through good communication, the creation of the Virtual Demonstration Garden was a success.

3.5 Do not overstep your bounds.

When an intern starts an internship he is generally excited and wants to impress his employer. There is a danger, however, in being too overzealous. Do not overstep your bounds as you work on your internship. Realize where the internship boundaries are defined. Feel free to offer new ideas and methods of completing tasks but be willing to do things the way the employer feels they should be completed.

3.6 Document your work.

Documentation of work can be a curse and blessing in the business world. After spending countless hours developing a project, the last thing anyone wants to do is to document the work. However, documentation can be a saving grace when future problems develop. It provides a paper trail of what has been accomplished and how it was completed. Most companies require some form of documentation to ensure consistency in project development. The best way that we found to document work was to complete documentation as we developed the system. Documentation can be as simple as a comment in code or a paragraph or two explaining the development process you have completed. Documentation of work, no matter how unpleasant it may be to complete, it is a vital part of the IT professional world.

3.7 Work hard and be dependable.

Hard work will always pay off in the end. When an employer provides you with an internship it is because you have met their requirements and you are willing to work hard. While we created the Virtual Demonstration Garden project we spent a number of hours outside of work learning new technology and developing the project. We were willing to go the extra mile and work longer hours. This impressed our employer and enabled us to produce a better product. Be honest with your employer and be dependable and your internship may become a regular job as it has for us.

3.8 Be a team player.

When an intern is hired or chosen for an internship she will likely meet and work with new people. An internship is wonderful way for a student to take part in team projects in the business world. Interns do not need to feel that they must prove themselves by working and accomplishing projects alone. An employer wants to see that the intern can work well with others as a team player and can offer skills to improve the overall development of a project. As we created the Virtual Demonstration Garden we had to rely on each others skills to complete the project. The project never would have been a success if we had not worked together as a team of interns and management.

3.9 Be self-motivated.

Producing a good product in the IT professional world requires self-motivated individuals. An intern needs to give an honest day's work for an honest day's pay. How you spend your time at work will be reflected in the quality of product or job you produce. During the development of the Virtual Demonstration Garden we consistently looked for ways to improve the project. The project became our project and is a true reflection of our work. Internships provide the opportunity to display your talent to businesses before you graduate. It is a time to be self-motivated.

3.10 Always look for ways to learn and improve.

In the changing world of Information Technology, learning new technology and methods is something that must always happen. IT encompasses many different aspects and has many wonderful opportunities for specialization in unique IT fields. An internship is a great opportunity to learn more about a particular niche of IT. Take advantage of every opportunity to learn from those in that IT field. The classroom can give a student a small taste of these different niches yet, an internship will help a student apply her skills gained in the classroom.

Never stop learning as an intern. An employer will not have the time or perhaps even the knowledge to answer every question an intern might have. When CUWCD hired us as interns to produce a website we had had very little experience in web design. We had to learn how to complete our internship because our employer had no one available to teach us the needed skills. The classroom provided us with the tools we needed to get started and we then had to acquire the necessary skills to complete the website. Our Internship was a great opportunity to apply the knowledge we learned in the classroom to a real world project.

4. How Businesses Benefit from Internships.

It is obvious that students benefit from internships, but how do businesses? When we started the Virtual Demonstration Garden no one knew how it would benefit Central Utah Water Conservancy District. As interns we offered many new ideas and ways to apply our education to the Virtual Garden. Through our education we had acquired skills that brought fresh ideas to the water district. The only constant in IT is change. Interns complete college with the latest technology skills. These skills can be a great asset to any company in their attempt to stay up-to-date in its use of technology.

Students seeking internships hope to gain experience to add to their education. This experience makes a student much more dynamic in his transition from college student to IT professional. Interns are often willing to work for a much lower salary than a regular professional, thus preserving business revenue. Interns are frequently more interested in the experience they can gain through internships than in obtaining large salaries.

As businesses create internships, it is important to consider the description of the internship. We discourage the creation of internships that are mundane and do not challenge the intern. CUWCD

created an internship that allowed us to be challenged in many different ways and in the end we were hired to continue the project.

Our internship experience taught us lessons and provided experiences that we feel are necessary steps in the development of an IT professional. By providing internships, businesses are creating more knowledgeable and experienced students who contribute to company growth. Students are more prepared to make the transition from academia to IT professional through internships.

5. Conclusion

Internships provide an opportunity for students to apply their IT education and skills towards real world projects. The experience gained through an internship can not be taught in the classroom or textbook. Communication with management is the key to a successful internship. Companies benefit from hiring interns, because the training interns receive produces better employees for tomorrow. If students have opportunities to complete internships while finishing their educational pursuits, they will be able to make smooth transitions from the world of academia to the world of IT professionals. We strongly encourage companies and educational institutions to look for ways to provide students with challenging and rewarding internships.

Bibliography

1. Sughosh, P. K *Software development models and planning.* Retrieved December 2004 from: VB Peer publishing, http://visualbasic.ittoolbox.com/browse.asp?c=VBPeerPublishing&r=%2Fpub%2FSPK112603.pdf
2. Phillip A. Laplante and Colin J. Neill, *The Demise of the Waterfall Model Is Imminent and Other Urban Myths*, ACM Queue Feb 2004, pp10-15
3. Miller, Steve *Best Practices for Software Projects – Iterative Software Life Cycle.* Retrieved December 2004 from: http://www.pragmaticsw.com/Newsletters/newsletter_2004_08_SP.htm

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