

Experiences in Industry Placement Shaping the Student's Mind in an Industry-Oriented Software Engineering Curriculum *

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Abstract Students who participate in industry placement as part of their software engineering curriculum gain knowledge that could never be taught to them in a class room. The knowledge and experience they learn allows them to focus and sharpen their skills in areas that industry craves expertise. The School of Computing in Dublin Institute of Technology provides the opportunity to students to gain industry experience with leading multinational IT companies and this enables them to learn key transferable skills to satisfy the desired requirements in a knowledge-based economy.

Key words software engineering teaching curriculum industry-oriented

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1 Introduction

There is a need in Ireland and abroad for students to possess strong practical software engineering skills at the beginning of their careers^[1]. Companies desire new graduates to have not only a strong theoretical technical knowledge but also significant practical experience. The fast pace and dynamic nature of the IT industry means that companies can not afford to spend long periods of time educating their employees with the essential skills that are core to the design and development of the product or service they provide^[2]. Hiring a new software engineering graduate always has a risk that their productivity will be outweighed by the time and training they initially need to receive. In some cases, this can be quite a long period of time.

The School of Computing in Dublin Institute of Technology has designed their software engineering curriculum to address these industry requirements. Students have the option to gain an industry placement at a world leading multinational IT company where they learn not only the practical elements associated with a software engineering discipline but also the social elements involved.

This paper describes the knowledge and experiences that some of these students gained during recent their industry placement and the impact this makes towards an industry-oriented software education.

2 Industry Experiences

Many students who choose the option of industry placement compete against their fellow classmates in gaining an internship position at their preferred IT company. Companies select their internship students based on an interview process and in some instances, a technical examination to ensure that the students have the minimum technical knowledge required for their position. In most situations, the School of Computing has experienced that companies usually recruit two or more students. Sometimes the work they do is similar but there are cases when the students may work in completely different areas.

According to the School of Computing regulations, each student in the industry placement programme is assigned two placement monitors, one industrial placement monitor from the company and one academic monitor who is usually a lecturing staff member. The author of this paper was assigned the role of academic monitor for six students who were recruited for their industry placement by a global world leading IT company whose European headquarters are located in Dublin, Ireland. This company has a proven track record for innovation and the development of sophisticated, robust and user friendly software. It has also gained a reputation by providing an enjoyable working atmosphere and strives to ensure that their employees are satisfied with their daily working environment.

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The students hired for their industry placement at this company were each assigned a specific task at the beginning of their placement. During the course of this placement, their task could be changed and modified depending on the student's performance. All of the students were given initial training in the use of the systems that they would operate. Following this training, four of the students were assigned tasks in the company's technical support department, one student was assigned to work as part of a team developing web services and the last student was assigned to work in a team developing software in a UNIX environment.

2.1 Communication and Presentations

During the course of the internship, the author received weekly log reports from the students that described the work they carried out during that week and included any new experiences they learned. There were many times that the students commented on new things that they had learned. These included learning how to give professional presentations to their group members on the work they had done. Presentation skills are something that many students find very difficult to learn in a class room and they also complement the student's ability to develop their communication skills at the same time^[3]. This was an invaluable lesson each student had learned since the company made it a policy for their employees to give regular presentations to their peers. In addition, the students were gaining a lot of confidence speaking to their co-workers on a technical level and learned how to filter information in way that could present the most important facts to their managers and team leaders.

2.2 Ethical and Professional Requirements

The students also discussed about the ethical and professional requirements of working at the company. These requirements were something that they never envisaged before starting their placement. The most important of these included the security, copyright and confidentiality of the products and services of the company. One student talked of their surprise about how strict the company placed emphasis on such matters. Since this was the first time this student had been employed by an IT company, it came as no surprise that they made this comment. The students learned about access rights to software, licence agreements and the need to keep all documentation private and confidential. This is something that is very difficult to teach students in a class where normally all software they design and develop is usually done as an exercise or part of project related work where security and confidentiality is of least importance.

2.3 Health and Safety

Regulations regarding health and safety were another issue the students discussed. Ireland has strict laws relating to such regulations in the work place and all companies must adhere to such. As a result, the students discussed about their surprise at how the company would ensure that the welfare of their employees was taken extremely seriously. The students talked about how the company made their working environment as ergonomic as possible and even employed consultants to give advice on the art of Feng Shui to promote better health. Other issues the company addressed included regular breaks, professionally serviced equipment and social gatherings for all staff at the end of the week to relax, integrate and have fun.

2.4 Professionalism and Personal Behaviour

A skill that is very difficult to teach students is professional level conduct. A student's aptitude towards professionalism is a trait that is learned through experience and working in an industrial environment. Some of the key skills that the students learned during their industry placement were personal behaviour and manners towards their colleagues, peers and managers. They spoke about the importance of not overly criticising their colleagues' work but at the same time, giving honest feedback and using this to improve and enhance the work carried out. They also discussed about learning the correct communication protocol towards senior managers, staff from other offices and visiting guests. This would include face-to-face meetings, conference calls and weekly departmental meetings. Another professional conduct issue that the students learned very quickly was their punctuality each day. For many students, life in a third-level institution brings a lot of freedom, including the choice of whether to attend their classes on time. This is not a luxury easily found in a working environment so the students quickly became accustomed to the strict rules of time keeping in their normal working day.

2.5 Annual Leave

Most Irish companies provide their employees annual leave of approximately one and quarter days for every month of employment. According to the School of Computing regulations, each student who gains industry placement must be employed for a minimum of six months. Any extra time employed after this length of time is usually in agreement between the company and the student themselves. Most companies therefore allow their employees to request their annual leave and holidays at specific times of the year and this must then be authorised by their manager. This was something that the students found interesting and initially thought not

very important. However, to the author's surprise, the students did not want to take holidays that they were entitled to. The students may have felt that if used their holidays during their placement, it might appear that they were not fully committed to their responsibilities. However, after meetings with their respective managers, the students learned that their company did encourage them to take holidays they were entitled to. The students began to understand that the company viewed this matter as an important health issue and it enabled their employees to get rest and relaxation and therefore be ultimately beneficial to their productivity when working.

3 Advanced Skill Set

There are many lessons the students learned during the course of their industry placement. Their technical and business skills advanced rapidly as a result of their daily tasks and allowed them to become more creative, flexible and imaginative. This was evidenced after the excellent reviews the students received from their managers at the completion of their placement. The students' communication skills also improved significantly. They not only gained the confidence to ask questions, but more importantly they learned how to ask the right questions. This is a skill that is very difficult to teach students and is mostly acquired through experience in an industry environment^[4, 5].

The students also learned to be agile with an almost unique capacity to initiate and innovate without the need for constant direction from their managers. They effectively learned how to think on their feet and adapt and improve their work on a daily basis. This was the result of an accumulation of all their collective experiences and allowed them to offer and present new knowledge and new ideas to the company. This was always welcomed by their managers and demonstrated a professionalism that the students had lacked at the beginning of their placement.

All of the students indicated that their industry placement gave them a valuable insight into the direction they sought most for their career. This is something that would not have presented itself to them within the confines of the lecture and laboratory rooms. The industry experience they gained demonstrated to them the respective areas in software engineering most suitable and applicable to their own interests and allowed them to explore and venture into other areas that they may not have necessarily thought about in the past.

4 Conclusion

This paper discussed the experiences of six

students from the School of Computing who spent a minimum of six months working in industry placement as part of their curriculum. During their placement, they learned many new skills and became accustomed with the important routines in a world-leading IT company. Many of the skills they learned and challenges they faced could never have been delivered to them in a lecture or laboratory class. Experiences such as this allowed them to show independent and maturity of thought, creativity and in some cases the ability to innovate by contributing novel ideas in the design and development of software.

A major benefit the students gained at the completion of their industry placement were ideas for their final year project. Some of these ideas spawned as a result of the work they had done but also, and more importantly, through the skills they had acquired to innovate and demonstrate creativity. These project ideas would not have been expected from a student with little or no industry experience and clearly demonstrated the influence that their industry placement has had in their overall software education.

At the end of the second visit with the students, the author ended his meeting by asking each student individually "What is the single thing you learned most from your industry placement?". Five out of six of the students replied that working as part of a team in a professional environment to meet deadlines was the biggest thing they learned. Only one student said that learning new technologies was the biggest thing they had learned. Being a team member of a multinational IT company has broadened their mind and added significantly to their industry-oriented education in software engineering.

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