

# **Transporting the Workplace into the Classroom: A Case Study at the Eastern Institute of Technology**

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## **Abstract**

The value of developing meaningful industry relationships must never be underestimated by tertiary institutes wishing to provide their students with the best learning experience possible. These relationships can benefit all parties concerned; opening educational, business, and employment opportunities. In 2002, the Eastern Institute of Technology (EIT) decided to build a purpose built information technology suite and upgrade its existing internal network infrastructure. As a result of the subsequent tendering process Allied Telesyn was identified as the preferred provider of networking hardware. Opportunities to develop meaningful relationships beyond the hardware purchase and support were investigated and included building naming rights, student sponsorship, industry course delivery, and graduate employment opportunities. This paper traces the ongoing relationships and explores how opportunities to build meaningful industry connections can be established within the existing programmes that a tertiary institute offers. The paper backgrounds Allied Telesyn and the services they offer and traces the steps taken to establish a new course within an existing degree structure base around industry content. The paper details the experience (positives, negatives, and problems encountered) of delivering this course for the first time and the placement of a student into employment via their 3<sup>rd</sup> year capstone project as a direct result of this initiative. The student concerned was the only graduate in the country to gain employment in a much sought after and highly competitive environment. We believe that such relationships are essential for any institute that intends to offer relevant tertiary qualifications that are geared towards meeting the needs of perspective employers.

## **Introduction**

The place of real-world experience in educational setting has been well documented (Velenchik, 1995). In 2002 an opportunity arose for the Eastern Institute of Technology (EIT) to establish a relationship with Allied Telesyn Research (ATR), a leading communications equipment developer and supplier.

This paper outlines the ongoing relationships between EIT and ATR, and the subsequent development of a third year data communications course which incorporated significant components of ATR's industry based training courses. The paper also describes the work undertaken as part of a capstone project (directed project) by a course graduate, which led to fulltime employment at ATR.

The paper commences by providing pedagogical evidence in support of 'real world' experiences in the tertiary educational sector. It describes the evolving relationship between EIT and ATR, and the circumstances that led to the development of a third year course within the Bachelor of Computing Systems degree. The paper then discusses the activities undertaken by a final semester student who undertook a software development project for ATR. The work done within the project led to fulltime employment for the student at ATR.

## **In Support of 'Real World' Experiences**

When ATR offered to provide switches and routers, and access to their industry based training materials, academic staff at EIT saw the opportunity to integrate "real-world" training materials into their traditional academic programme. The use of Allied Telesyn's materials and the ability to use modern switches and routers, enabled what was previously a mainly theory component of the BCS programme to include industry specific practical training.

The value of learning activities that focus on “real-world” events and interactions have been recognized by educators for some time. Over the last two decades, educational institutes have been busy incorporating industry-based training and project-based learning materials into their programmes, to give students a taste of what they are likely to encounter when they take up employment.

Pedagogical support for the integration of “real-world” activities into traditional academic courses can be found in the theories of constructivism and constructionism.

Papert (1993) describes constructionism as both a theory of learning and a strategy for education. Papert built on the "Constructivist" theories of Jean Piaget (1990), which suggested that knowledge is actively constructed in the mind of the learner rather than simply transmitted from teacher to student. Learners are more likely to create ideas than get ideas. Constructionism also suggests that new ideas are most likely to be created when learners are actively engaged in building some type of external artifact that they can reflect upon and share with others.

Constructionism is similar to constructivism in that it supports the idea that the learner is an active builder of knowledge. However, constructionism emphasises the particular constructions of external objects that are shared by learners. Although learners can construct and present knowledge or meanings without producing external products, the processes of construction is more evident when learners produce through social interaction with others and share representations of their understanding and thoughts.

Supporters of constructionism adhere to two fundamental principles. The first is that the best-learned lessons are ones in which students discover for themselves through their own struggles, and the second is that the most useful kinds of understanding and judgment cannot be taught but must be learned through practical experience (Volpe, 2000).

Velenchik (1995), a supporter of constructionism, highlights issues addressed by the use of “real world” case studies. Case studies motivate students to learn by providing a platform where tools are needed to solve problems. Students then start looking for the tools rather than expecting to have them delivered. Case studies also encourage students to apply the theory, placing a focus on analysis and evaluation, enabling students the opportunity to identify limitations of theory.

The emphasis that case studies and industry placements place on analysis and evaluation helps students move up the cognitive skills ladder from the low level skills of comprehension to the higher level skills of analysis and evaluation. The case study method provides a stimulating environment within which to develop the cognitive skills in learners.

### **Introducing Allied Telesyn**

The emphasis that both the EIT Charter and the Tertiary Education Commission Strategy have placed on industry relationships and collaboration, illustrate the importance of tertiary institutes (EIT) and industry (ATR) working together.

ATR is based in Christchurch and is the leading research and development arm for Allied Telesyn International. ATR is responsible for developing the company's most advanced and innovative networking products. In 2002, ATR won a contract to provide a replacement backbone network at EIT. When the contract was signed, the two organisations decided to investigate if it was possible for both parties to gain from additional non-contractual relationships.

The integration of ATR training materials into EIT degree courses was seen as a mechanism which had benefits for both parties. EIT would be able to offer a course that was sanctioned by industry and would be seen by students as being relevant providing improved employment prospects. ATR agreed to provide a class set of layer three switches and provided access to their course training materials.

In 2004, this relationship was further extended, when a third year final semester student was offered the opportunity to complete their capstone project at ATR. This was an important milestone in the ongoing relationship between EIT and ATR

### **The Third Year Course**

When ATR offered to provide switches and routers for a software laboratory and access to their industry based training materials, EIT began looking for ways to use the provided resources within their existing programmes. It soon became evident that there was significant overlap between what was covered in two degree-level Data Communications and Networking courses and the areas covered by the ATR materials. It was fortunate for EIT that the investigation coincided with an EIT wide review of all degree courses, conducted because the institute had decided to adopt a standard structure of 15 credit courses for all degree programmes.

The content for the two Data Communications and Networking courses was rearranged with the year one course aiming to provide the students with a knowledge of the concepts of data communications and networks and the year two course aiming to use the concepts of the year one course to provide students with skills in planning, installing and using data communication facilities. While the resulting two EIT courses covered much of the content of the Allied Telesyn training courses, there were sufficient materials requiring skills at the higher levels of the Bloom's Taxonomy model (Bloom et al, 1964) in the Allied Telesyn training courses, which had not been covered, to develop a meaningful third year Data Communications and Networking paper.

Modified prescriptions were prepared for the two existing courses and a new prescription was prepared for the third year course. The prescriptions were reviewed by industry, the degree monitor, students and other tertiary institutes and passed to academic board for approval. Once the courses were approved, a decision was made to offer the third year course as a summer school using block mode delivery. The course was oversubscribed and local industry expressed a desire to have their employees participate.

Prior to the course being delivered, Allied Telesyn ran a training course for EIT academic staff and EIT Computer Services staff. The course provided valuable experience for EIT staff, and enabled the staff who would be involved in delivering to participate using the case study approach adopted by Allied Telesyn. This move helped strengthen the growing relationship between EIT and Allied Telesyn.

### **Capstone Project**

The culmination of the Bachelor of Computing Systems at EIT, as for most applied Information System degrees, is a final year project which is viewed as the "capstone" of the degree. The project can be taken only in the final semester of study and it integrates a student's knowledge, skills and understanding of IT into the analysis, definition, development and implementation of a business organisation's computing activity (Bridgeman, 2003; Mann and Smith, 2004).

The project provides students with the opportunity to research, select, integrate, and apply a range of techniques and technology in the solution of a complete realistic problem. According to Dobbelstein and Taylor, (2004); and Taylor (2002), co-operative education typically occurs when a learner is placed into the actual working environment by a higher education institution - in this case developing the project for industry while studying towards the degree.

During the early part of 2004, ATR approached EIT with three "nice to have projects" that they had on their wish list and wondered whether any of our Data Communications three students would be interested in doing them for their capstone projects. All three projects were out of the scope of many the students; however the "Cisco to Allied Telesyn script converter" was taken on board by the top student from the Data Communications three course.

In brief the project was to "build an application that would convert Cisco networking commands into Allied Telesyn's native language". As this project had never been undertaken by ATR before, the student was supplied with the necessary resources and given technical support from ATR and then "dropped in the deep end". The project was out of the normal scope of many of the other capstone projects that were undertaken at EIT, so an open minded approach was adopted from the institute's point of view when it came to supervising and marking the final output.

The normal systems development process was followed throughout the project. During the programming stages of the project the student had to incorporate many years of previous programming and scripting experience to enable a successful output. Numerous visits were made to the Allied Telesyn after sales technical support centre in Lower Hutt, throughout the life of the project. With the final 45 minute presentation of the working product made to ATR management and senior technical staff at ATR headquarters in Christchurch.

Following the presentation, which demonstrated the application to satisfy the original project brief, an offer of temporary employment was made on the spot, which has subsequently turned into permanent fulltime employment with ATR.

## **Experiences**

### **The Third Year Data Communications and Networking Course**

When students had completed the third year course, which was based heavily on the ATR industry courses, they were asked to rate their feelings about various aspects of the course against a five point Liechhardt scale, where a score of five indicated that they strongly agreed and a one indicated they strongly disagreed.

When asked if the course had extended their current knowledge and skills, all students agreed that it had to some extent. When asked if they believed the learning materials were helpful and well presented, all students agreed that they were. This indication of support for the materials was pleasing since the majority of materials used were provided by ATR. When given the opportunity to comment on the quality of materials, three students expressed concern that the materials appeared to be out of date, and that significant sections of the materials provided appeared to be repetitive. When asked if the course was easy to follow, 90% of students indicated that it was. However, several students indicated that the shortened delivery timeframe gave little time to consolidate and cement ideas.

When asked about support for the block mode method (two week block course) of delivery, 70% of students indicated that it was a good idea, but when it came to agreeing that all 700 level courses should be offered using block mode delivery support fell to just over 40%. Comments made by students about the block mode delivery indicated that the time frame was too short and that block mode delivery would only be suitable for courses which had a high practical content. Others suggested that it was good to be able to concentrate on a single subject, compared to the traditional situation where students have to juggle the learning of up to four subjects concurrently. One student commented that they appreciated the focused approach and another suggested that it made learning easier.

All students indicated that they appreciated the opportunity to participate in a course which had strong ties industry and they expressed support for aligning degree courses with equivalent industry courses. Even though the number of students participating in the course was limited to half the normal practical class size, two students indicated that every student should have individual access to multiple switches, and that more powerful and sophisticated switches should be available.

When the course was delivered at EIT it was decided to share the teaching responsibility among three lecturers, as a way of reducing staff work loads and providing some form of variation for students. All three staff noted that students appeared to be well motivated and that they applied themselves to their work consistently. Many students stayed after formal class times to practice the skills that had been taught and the level of student interest appeared higher than that shown in the more traditional data communications courses.

### **The Capstone Project**

Since a capstone project of this nature was a first for both EIT, there was a fair amount of uncertainty as to how both the student and EIT would work towards a successful outcome. The initial project brief to the student had limited information and this required the student to be proactive and initiate a

dialogue with ATR. With the student working remotely from ATR, numerous visits and meetings were pre arranged with ATR providing financial support to the student to visit their premises.

After defining the scope the student, rarely required support from either EIT or ATR, until the project neared completion. As a result, the issue of geographic isolation from ATR was not too much of an issue. As the project scope lacked specific detail it allowed the student to adopt a flexible approach. This resulted in the student developing his own scripting language and allowed him to develop an application which did not have too many specific requirements. While many students may have found the lack of direction a little hard to adapt to, the student undertaking the project flourished in the free flowing development environment that was provided.

Following the completion of the project, came the opportunity to present the output to senior management at ATR. This was a great achievement for both EIT and the student. From EIT's perspective it was satisfying to be able to offer ATR some return for their initial sponsorship and support. From the student's perspective it meant they were able to take an opportunity with both hands and present the work to a potential employer. The ATR management team was so impressed with the finished product and the caliber of the project presentation that they made an offer of employment.

Overall the student enjoyed the flexibility given in the project brief and was at times challenged with meeting the desired outcome. Working remotely proved to be no real issue as previously thought and the previous experience that the student brought to the project in this area was a real plus and helped with a successful outcome where many students would have not got to.

## Conclusions

The experiment with block mode delivery and the incorporation of industry specific content into a degree course was seen as a successful exercise and worthy of further investigation.

To allow students more time to consolidate the materials covered during the course, it was agreed that students would benefit more if the two week delivery period was separated into two blocks with time given between for students to conduct research and practice the skills learnt. Since the course was a summer school offering, the first week could be delivered in early December following the completion of semester two, and the second week could be delivered in mid January.

The experiences gained while the student completed the "capstone" project, have made staff supervising projects at EIT aware of the need for flexibility when managing and evaluating project outputs. The technical nature of the project and the lack of a specific project brief, which could have been viewed as potential pitfalls, provided opportunities for a student to excel and produce quality outputs that impressed the industry partners.

The relationship between EIT and ATR has proven to be beneficial for EIT and it has increased the profile of Allied Telesyn among the tertiary information technology teaching environment. EIT now has a number of students who have practical experience working with Allied Telesyn products, and the two organizations are investigating further opportunities for students to undertake their industry project placements working alongside ATR staff. The success of the first student, in completing his "capstone" project and his subsequent offer of employment has helped strengthen the ties even further. Since the appointment of the student, ATR have offered a scholarship for the best data communications and networking students for 2005. The scholarship includes financial assistance with fees for the year and an opportunity for paid holiday employment in Christchurch.

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