# THE CAPSTONE PROJECT - A FOUNDATION FOR WORK?

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## ABSTRACT

This paper represents an attempt to gauge the effectiveness of the student work placement that forms a compulsory part of the Bachelor of Information and Communication Technologies (BICT) taught at Christchurch Polytechnic Institution of Technology (CPIT). In this paper, the effectiveness will be judged in terms of how well it appears to prepare students for work within the IT industry. A survey is used given to students to establish how well they felt prepared for the workplace before and after the project and hence how they feel the placement contributes to their preparedness.

Two areas are examined; specific, technical preparedness and more general competencies such as time-management, interpersonal or social skills. The study is not exhaustive, but responses are believed to reasonably represent a majority of BICT students both past and present. Further study along this path will incorporate more detailed analysis of how the employers and academic supervisors feel the project affected the student's knowledge and skill formation.

## Keywords

Work placement, learning experience.

## 1. INTRODUCTION

The provision of a work placement in a course of instruction at a Polytechnic has long been an indispensable feature of its instructional delivery. Polytechnics have traditionally sought to include contributions from industry into their course design to better reflect current industry practice. Many believe a powerful incentive to include work placements is the search for what is frequently termed "real" experience, as this quote from Robert French's Management Education and Development article ten years ago illustrates: "... essential learning cannot happen on the campus of an educational institution. It can only be done through experience in real organisations in the field." (Cameron-Jones and O'Hara, 1992 in French, R., 1993).

French's article makes much of the near-obsessive belief that many pedagogues hold - real learning experiences can only be obtained outside the classroom - he then calls this view into question with a series of well-argued points, which fall outside the scope of this piece. Nevertheless, there is a substantial body of opinion that prizes extra-mural experiences above other types, as far as equipping students for the workplace is concerned; for the purposes of this paper, this will be taken as a given. As Clear et al note: "The capstone course will, among other things, have a maturing, confidence-building effect on the students." (Clear, 2001)

This view was put forward by Kryt 10 years earlier, who said that, in the field of systems analysis and design, lecturers were "getting behind industry" and fearing their material is four or five years behind industry, he posed the question: "Should we give up and teach what is often obsolete? The answer is "No." If we are not able to do it by our own means, let us enlist the help of industry and of those who can do it for us." Referring to the "Inflexibility of Academic Programs", he went on to say: "Because of existence (sic) of an obvious need and inability to do the job ourselves, we academics want to enlist greater than usual help of outside experts to allow us to complete what we consider an essential task." (Kryt, 1983, pp123-127) In light of the amount of assistance being sought from industry, one could usefully ask what should be taught, as well as by whom.

Do students need competence, capability, aptitude, capacity and confidence in order to succeed in the workforce? In what measure would each be needed?

Competencies, and capabilities, their measurement, nature, selection and means of acquisition have been discussed at length elsewhere - an informative treatment was presented by Rainsbury, Burchell and Hodges who explored several definitions of competency and related concepts and pointed to a range of often contradictory interpretations available in the literature (Rainsbury, Burchell and Hodges, 2000). Of note here are contrasting views placing on the one hand, capability as a pre-requisite to competency (Rudman, 1995) and on the other, competency underpinning the ultimate goal represented by capability (Stephenson, 1997). A taxonomy of competency, due to Birkett, provides an interesting classification of cognitive and behavioural skills and personal characteristics respectively. (Birkett, 1993 in Rainsbury, Burchell and Hodges, 2000) The technical skills acquired allow "application of technical knowledge with some expertise." Once mastered, problem-solving skills build on the previous level achieved and in turn this can lead on to evaluation of complex situations and finally the formation of creative judgements. Behavioural skill levels start with "personal", progressing through interpersonal and ending with organisational skills, requiring the achievement of "outcomes through organisational networks." (Ibid, p15)

In many cases the involvement of industry has extended to sending students into the workplace to achieve learning outcomes. There are many reasons for wanting to do this. (Schaafsma, 1996) In some cases the involvement extends to actually assessing the student, an act that tends to cause controversy in tertiary circles. It has been the practice at CPIT to incorporate marks from BICT students' industry-based supervisors since its inception in 1996. From the outset, the BICT degree programme was to involve local industry in the programme design of the BICT, including the design of the cooperative education component itself, and invite project supervisors to contribute to the overall course mark. CPIT's School of Computing also turned to local industry to host students to carry out approved projects as work placements. The high number of students retained by companies following project completion bears testimony to the successful completion of the work placements and appears to be unrelated to the project's paid/unpaid status.

## 2. RESEARCH DISCUSSION

A number of factors were considered to affect preparedness for work, including the large number of course combinations students take as part of the degree programme, the different levels of success each would have achieved prior to starting the placement and the diverse sorts of jobs students might take up after graduation. In addition, the students were from different cultural backgrounds, aged twenty to forty five and had previous job experience ranging from zero to twenty five years. These factors made direct comparison difficult. While students with similar course grades might academically be similarly qualified, then, their other differences were so marked that a meaningful comparison would be hard to justify. In any event, the exercise would have led to a potentially unwieldy model of work-preparedness; the resulting analysis therefore would be more open to widely different interpretation. It was decided not to try and measure and compare these possible factors. Instead, since comparison between students was not sought in this first survey, the focus could be turned to a much simpler issue - that of gauging the aggregated difference made by the work placement on apparent competencies, across all students. The intention was to create a measure simple enough to be easy to collect, record and interpret and thereby appropriate to judge a work placement's effectiveness in preparing students for work within the IT industry, not in absolute terms, but as perceived by the students themselves.

Surveying this particular group (busy students reluctant to spend time on a survey) meant providing something that was simple to read, understand and complete. It was felt that the best way to measure the effects of the placement was to survey students on some indicators of preparedness both before and after the work placement, using a questionnaire. Likert scales were devised, according to suggestions made during a number of conversations with students and staff connected with the cooperative programme. It is acknowledged at the outset that students' *actual* preparedness, perhaps more meaningfully judged by the organisations that might employ them after the course, would be unlikely to perfectly match the students' own perceptions. This particular question will be addressed in a follow-up survey that will attempt to discover the views of employers, employment agencies and lecturers with regard to these qualities and explore possible reasons for any areas of accord and discord. The first question was: "How did you rate your overall level of confidence regarding the prospect of starting work on this particular project and your ability to satisfactorily complete it? The others were similarly posed, seeking corresponding answers to "technical competence" and "other competencies" gradings. A confirming question asks students to comment on the extent to which they believe any changes claimed are in fact due to the work placement, rather than some other, spurious reason or combination of reasons.

This initial survey therefore, focusses on the students, the effect of the work placement on their technical capabilities and their overall level of confidence following a five-month project conducted under the supervision of an industry supervisor. The competencies chosen were not very specific since the students were completing a degree that allows reasonably distinct or specialised paths to be taken. In addition students tackled projects that were also very disparate in nature and content and/or degree of technical difficulty. Student responses were gathered by a variety of means. There was an additional section for "any other comments" and where completed, this

section allowed for some depth and breadth to be included in the survey's remit. Some quotes from this section have been included in order to provide both perspective and a little more detail.

## 3. SURVEY RESPONSES

The student responses were accepted by telephone, by post in hardcopy and electronically by means of an on-screen, word-processed document submitted via email attachment. It is felt that the range of possible means of completion was a contributory factor to the relatively high percentage of returns. When collected by phone, every effort was made to ensure full understanding of the question and to avoid any tendency to suggest a more or less appropriate response. There were 13 responses from the 14 requests, a response rate of over 90%. The high strike rate is attributable to the relatively small population and the tendency for the majority of the subjects to remain local, making contact rather simpler; there is possibly a sense of obligation felt by the subjects who were all known to the author. Since the subjects are known to the author, there may also be a bias to the sorts of responses returned due to students wanting to please the author.

To counter this, it could equally be said that disgruntled students would have an interest in skewing the responses in the opposite direction. Such students may wish to create a negative impression of the work placement, blaming this for their poor performance - as judged by their industry or academic supervisor - with the placement organisation. The attached tables show the modal values of the three categories as measured before and after the placement. Modes rather than means were used, since the positions on the Likert scales cannot meaningfully be averaged among the respondents, since the interpretations used by individuals tends to vary significantly and unpredictably and the absolute, true measurement values cannot be established for all respondents. Below are some student quotes from the section devoted to additional comments:

*"Good experience - putting theory into practice."*
*"Opened your mind up to what was being done to the workplace."*
*"Had some difficulties with the workplace/work environment. Having got back into the workforce, [I] was able to use research skills learned on the degree to re-establish confidence. Fantastic experience - buffer zone before the workforce."*
*"Surprised at how well fitted in."*
*"[I was a]... mature student starting the project ... project was not clearly defined ... [I] had to adapt ... to suit the course requirements. Stood [me] in good stead for work in IT/IT-related study."*
*"Getting out there is good because it removes the mystique of the gap between what you're learning and what happens in industry."*
*"Immersion was central to [the] process of learning ... [the project was] instrumental in choosing [my] career path."*

## 4. ANALYSIS OF RESULTS

There was a movement along the Likert scale of one point (out of five) which tends to support the desired result: that the work placement produces a positive effect on the perceived level of confidence and competency of the students. In addition, the responses to the question: "To what extent do you think the work placement was responsible for any changes in the above grades?" strongly indicate that the students feel the changes are due to the work placement, rather than any other reasons - the modal score was a maximum 5 out of 5.

There are obvious limitations with a survey of this scale. The sample and total population is quite small and the measures used to collect unproven - it would be imprudent to make too much of the results for these reasons alone. Many of the students contacted so far are quite well-known to the author and their responses may be influenced by that fact. For example, if a student had had a highly successful placement and the whole course had gone well, such a positive outcome may predispose them to proffer responses that show the placement in a good light. It should be noted, however, that a large number of students had at least some significant difficulties with the placement and might therefore just as easily be expected to submit unfavourable responses as a form of crude retaliation.

## 5. CONCLUSIONS

This survey was intended to light the way for a future, more comprehensive review of the efficacy of the BICT work placement; any conclusions will therefore be, at best, tentative and narrowly focussed. That said, it was at least gratifying to note that the changes in confidence and competence shown by the chosen measures were in the desired direction. Students' own impressions of their confidence and competence levels were substantially improved following the work placement, indicating the worthwhile nature of the course and repaying the considerable investment made by academic staff and industry supervisors alike. This result, despite the small sample size, builds on the considerable amount of anecdotal evidence supplied by industry supervisors during the six years the course has been run. There have been some suggestions that the cooperative education course is something of a luxury using the standard pricing model for classroom-based teaching and consumes a disproportionately high level of human resource for the income it generates. This survey adds more weight to the argument that what a work placement can offer the student is irreplaceable and their presence in the

**Table 1: Differences in repsonses before and after work placement**

| Pre work placement | | Post work placement | | Difference |
|---|---|---|---|---|
| Question Number | model value (1) | Question Number | model value (2) | Difference = (2) – (1) |
| Q7 (confidence) | 3 | Q10 | 4 | 1 |
| Q8 (tech skills) | 3 | Q11 | 4 | 1 |
| Q9 (other skills) | 4 | Q12 | 4 | 0 |
| | | Q13 | 5 | |

BICT remains a vital ingredient in the CPIT's course mix. Attempts to substitute industry-based experience with more classroom courses would dilute the course mix and remove an important differentiator between the BICT programme and others unable or unwilling to include it.

## 6. FUTURE DIRECTION

It is proposed to first extend the survey to increase the sample size and thereby enhance the validity of the findings thus far. When this has been completed, opinions of academic staff and industry supervisors and other representatives of the IT industry will be questioned using equivalent measures employed in the students' survey. An attempt to create some indicators of absolute levels of competence will be made adapting the measure used for this initial survey to suit the other stakeholders in the competency picture: the host companies that provide the industry experience and the academic staff who act as the students' friend and guide for the duration of the placement. Their views on the students' level of competency will hopefully provide some degree of triangulation and, like as not, a contrast to the students' own viewpoint.

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