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Developing an IT project management course to meet changing industry needs

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ABSTRACT

Acknowledging that an awareness of project management skills was an important outcome for their graduates, the IT faculty of one Australian university developed and introduced a new IT Project Management course into their undergraduate curriculum in 2002. A three stage approach that involved identifying students expected learning outcomes, selecting relevant content and choosing the most applicable pedagogy was applied in designing this course. An integrated case study approach, developed over a five year period which was to be the recipient of many teaching awards is described. However, despite its popularity and successes the course was totally rewritten for the 2008 academic year, reflecting alternative views about what IT Project Management courses should contain, which in turn prompts the question of what project management skills should we be teaching students in preparing them for professional IT careers?

Keywords

Case method, course design, project management, teaching.

INTRODUCTION

The need for improvement in the delivery of IS/IT projects has been well documented, with many projects cancelled before completion, many running over budget or over time, and many 'completed' with less functionality and/or more unreliable than expected by clients (Marchewka 2006, Meredith and Mantel Jr 2006, Schwalbe 2006). Project management has encompassed virtually every industry in the world, though the application of project management techniques still varies according to the type of industry in which they are being used (Kerzner 1987). Unlike other types of project management such as civil engineering, there are still, as yet, few undergraduate multi-course programs offering a specific Information Technology Project Management (ITPM) focused outcome. This reflects the fact that within the ICT sector there are not the same specific ITPM career paths available as there are in sectors such as civil engineering (Sauer, Johnston and Liu 1998). Project manager career paths do exist in many industry sectors, yet IT project managers appear to be rarely selected because they have been 'nurtured' or 'developed' for that specific role. If more specific ITPM qualifications did exist maybe industry would not have to rely on selecting non project management skilled individuals.

> *"At best, they have been identified as having project management potential, and at worst, they are technical specialists who have been selected because they happen to be available — the-first-person-to-walk-down-the-hall syndrome" (Sauer, Liu and Johnston 2001, p40).*

In 2002 the IT faculty consisted of two schools; a School of Software Engineering & Data Communication (SEDC) and a School of Information Systems (IS). Although both schools had agreed on the need to teach students IT project management skills, precisely what those skills actually consisted of was to be the subject of ongoing debate (some might even say acrimony) between them and indeed various stakeholders in both schools, for the life of the course. This situation somewhat reflected the ongoing confusion and uneasiness by many over what is actually meant by 'IT Project Management'. It did appear as if the more technically oriented SEDC considered the role of the IT Project Manager more as one of software development manager whereas IS considered the role as the coordinator of all the various functions associated with delivering an IS/IT project.

There was, however, common agreement that in recognizing the IT industry's generally poor project delivery performance, while concomitantly acknowledging different requirements for the IT sector, a specialized 'IT Project Management' course was needed in the faculty. It was subsequently developed and first offered as an elective in 2002 for both postgraduate and undergraduate degrees. Although project management courses were already being offered by this university's business and engineering faculties, this was a conscious effort by the IT faculty to address what was believed to be an industry specific need.

In a situation, where there was no common agreement on what student learning outcomes should be, a conscious decision was taken to be guided more by external influences. Industry background and consultation, academic and professional experts in project management and published research was predominantly used for determining the initial directions that the course was to take. Bearing this situation in mind it was imperative to consequently undertake extensive and ongoing evaluations of the course to ensure that it was meeting faculty expectations. The original decisions made and these ongoing evaluations form the basis of this paper.

COURSE DEVELOPMENT

Although there had been an ongoing attempt by the faculty to develop a specialized ITPM course using its existing academic staff, it was not until the appointment of a new academic who had had an extensive professional career as a project manager but also as a software development manager, that the idea achieved momentum. This new academic, although having a good deal of practical experience in the field, had absolutely no experience of course design. Out of sheer necessity therefore, the course development became one of close collaboration between academic learning and teaching experts and the industry practitioner who had recently joined academia. A three stage approach was ultimately suggested by the learning and teaching experts as a framework for developing this new course, although the reality and even the rationale of defining learning objectives and content, and selecting a suitable pedagogical approach was not initially understood by the academic actually administering and the course and its development. Although any course of this type can, of course, be developed by either academics or by industry alone, the strong collaboration between academia and an industry savvy individual was to provide clear synergies that might not have been apparent if either partner had worked individually.

Learning Objectives

There were to be some vigorous and ongoing debates between different factions relating to the defined learning objectives of the IT project management course run by the faculty. Though the principles of the course were initially agreed to by the School of SEDC it was being championed by the School of IS. The course was subsequently designed to address what was considered, by IS academics involved, as the need to provide IT faculty graduates with the most appropriate skills to contribute efficiently and effectively in the environments which they would soon be working in. At the undergraduate level, even though the course was nominally called IT Project Management, it did not focus on creating IT project managers per se, but more on how to provide students with a better understanding of the true nature of project management in IT and how, as future members of their project teams, they might better contribute to IT project success. It could accurately be described as focusing on 'soft' issues rather than concentrating merely on the documentation, methodologies, processes and tools that Mulally (2002) suggests are still the basis of many project management courses today.

Over the next six years the course was to undergo some significant changes in format but still retained the same fundamental learning objectives. The learning outcomes that were originally intended appeared to have been achieved, with the citation for the national teaching award that the course contributed towards in 2007 stating:

> *"For establishing real-world perspectives of knowledge intensive project environments, providing students with state-of-the-art skills which enable them to become valuable project team players", (Carrick Institute 2007) .*

Though there was awareness that industry requirements for IT/IS graduates had for some time been changing, there had been little attention paid to those changing needs by many universities. As was the situation with many other IT faculties around the world in the early part of this century, the sustained high demand for IT degrees (from both international and domestic students) had made wholesale changes to course structures difficult to justify. Warnings of changing industry demands for IS professionals had, however, been provided years earlier in a joint academia/industry research project conducted by Lee, Trauth and Farwell (1995) yet these trends had generally been ignored by many IT faculties.. However, development of this new course provided an ideal opportunity to take a fresh look at topical graduate attributes that framed the course learning outcomes, so in association with consultations with IT/IS industry experts and academic experts in the IT management field the desired learning objectives (and outcomes) for the course were eventually agreed upon.

Even when confronted with what became a severely declining global demand for IT degrees coupled with new research on IT workforce trends such as that conducted by Zweig, Kaiser, Beath, Bullen, Gallagher, Goles, Howland and Simon (2006), there were still many project management courses consisting of little more than either understanding project documentation processes or identifying the nine sections of the PMIBOK, (PMI 2000). Failure to identify the now obvious changing needs for IT graduates may have implications beyond that of individual courses and extend into the future of IT degrees themselves. The worldwide downturn in demand for IT degrees may merely be the manifestation of changes in industry demands. As Zweig, et al. (2006, p104) have suggested,

> *"Organizations seeking to hire programmers have [only] a slight preference for candidates with undergraduate computer science or electrical engineering degrees. Those seeking to fill entry-level positions requiring systems analysis skills tended to look more frequently at candidates with undergraduate business, MS/IS, or MBA degrees",*

The developers of this course did acknowledge at the outset such changing industry demands for IT graduates and set about developing outcomes that would be desirable in graduates.

Content

The literature suggests that 'achievement of success' figures prominently in defining a project manager's role. There is normally however a more implicit requirement which is not always so readily recognized but might be considered of equal importance; a need for the project manager to be accountable and responsible for what occurs within the project. Preparing how to successfully complete their projects, whilst accepting that they are ultimately responsible for what transpires within the boundaries of the project might therefore be considered as the prime learning outcome for a project manager.

According to Murch (2001) distinguishing the particular skills of project manager's who are primarily responsible for project success typically revolve around variations of various soft skills such as,

- Excellent communication skills
- Ability to connect with people at all levels of the organization, and
- Able to collaborate to develop effective solutions.

Projects generally do not fail because of the lack of adequate technology, even though we may worry about whether the technology chosen is the right one.

> *"Statistically, most projects fail because the 'soft science' portions of the project have not received enough attention – the human factor has not been adequately addressed" (Murch 2001, p17).*

The principal goal within this ITPM unit was thus deemed to be to prepare students for helping to achieve project success and the acknowledgement of their responsibility in that role. The clear objective of the unit was thus to teach students how to increase the likelihood of that success by providing an understanding of,

- The factors likely to contribute to project success.
- The factors likely to contribute to project failure.

Rather than merely teaching a set of principles and procedures, the course aimed to provide students with an appreciation of the complex and multi-disciplinary nature of IT project management, which included all the administrative, technical, communication and socio-political demands placed on the modern IT project manager. The raison d'être of the course was to indicate the broad range of skills required of the successful modern IT project manager rather than an attempt to explicitly provide instruction in each of these skills. Although earlier in their degree programs students may have been introduced to concepts such as communication, budgeting, problem solving & decision making and ethics, this was arguably the first opportunity for students to apply these skills holistically in a complex problem solving environment rather than singularly.

The eventual selection of predominantly softer issues in this particular project management course was actively opposed by some sections of the faculty who passionately believed that any IT course must focus on technology first and foremost. It was then, under a cloud of considerable internal discontent that the actual content selected was eventually agreed on by the faculty executive. The course content eventually agreed upon aimed at providing the most appropriate skills and relevant knowledge for final year undergraduate students to take with them into the modern IT workforce.

Pedagogy

Once the course content was chosen, a pedagogical approach was sought that would provide the most effective and efficient means of learning that content. It is widely accepted that project managers in other disciplines usually have more pre-determined career paths which involve mentoring by senior project managers with a gradual increasing of the importance and sophistication of the projects in which they are involved in. Because there is seldom any equivalency within the IT sector, it was anticipated that involving students in 'real-life' projects might be the closest to imitating project management training from other industry sectors. In practice however, the overwhelming administration and quality assurance required when involving more than a handful of students in live projects, resulted in a 'next-best-thing' option being considered.

Case method teaching can, according to Mostert and Sudzina (1996), describe real-world problems that are too complex to approach experimentally (Glaser and Strauss 1967, Lincoln and Guba 1985, Patton 1980). Arguments for the use of cases include:

- Cases investigate phenomena in a real-life context.
- Cases are appropriate where the boundaries between the phenomenon and the setting, as in classroom instruction, are not clearly evident
- Cases use multiple sources of evidence to describe the phenomenon under investigation.

> *"Effective cases portray real people in moments of decision, faced with a need to take action and accept its consequences", (Barnes, Christensen and Hansen 1994, p285).*

Good cases are as a 'second-best' alternative to apprenticeship and permit a 'long look over the shoulder of a practitioner at work', (Barnes, et al. 1994, p287). As these types of benefit were ideally matched to the goals and objectives set for the unit a decision was subsequently taken to incorporate a case method approach into the pedagogy. In an attempt to make this method as 'real' as possible a single case study approach was chosen in which it was hoped that students might deeply embed themselves. Although still not equivalent to physically being a member of a team in a real project, it was hoped that 'deep immersion' into an actual case, might provide students with experience and understanding of the frustrations and elations that are part of most project environments, an appreciation of the real difficulties faced by project team members, and explanation of the real purposes for using the theoretical constructs covered in most project management training.

> *The case study method of teaching, providing a moderately realistic context to explore applications of academic theories and models, had already been used extensively in MBA and short executive courses but it was a method less known in IT departments and faculties, (Sauer and Willcocks 1999).*

Case method teaching can describe real-world problems that are too complex to approach experimentally (Mostert and Sudzina 1996). Lawrence cited in Erskine, Leenders and Mauffette-Leenders (1981) summarizes the benefits of using a case method approach by suggesting that,

> *"It is the record of complex situations that must be literally pulled apart and put together again before the situations can be understood … A good case keeps the class discussion grounded upon some of the stubborn facts that must be faced in real life situations".*

A constraint with using cases in courses of this type is thought to be the lack of availability of appropriate material. While a case's life span varies, Sauer and Willcocks (1999) believe that in a fast moving area like IS/IT many cases lose their freshness quickly. It is therefore sometimes more convenient to adapt business cases such as those from Farhoomand and Lovelock (2001), developed primarily for use in MBA and executive development courses, for use in IS/IT settings, even though they may not include any specific IS/IT application component. Additionally, the potential benefits of writing your own case study and subsequently using it in case method instruction provides an increased sensitivity to all teaching documents, enhanced effectiveness in preparation skills and the production of materials that help blur the distinction between the seminar room and the world 'out there', (Barnes, et al. 1994, p285).

The selection of appropriate cases for use in an IS/IT environment would therefore appear to be a critical factor in whether the case method might ultimately achieve the desired learning outcomes. The academic entrusted to develop this course had been a practicing project manager prior to joining academia and had been involved in many leading edge IT projects. As part of his postgraduate studies, he had already written a 5000 word case study covering his involvement in an international IT project. Although this case study had been originally written merely as an example of how the lack of software quality assurance processes may have contributed to the project's ultimate failure, it was considered that the case still provided enough generic project management background for it to be used without any significant modifications. The case covered real events documented over an 18 month contract period (1996 to 1998) by one of the project team member's, providing an example of the special mode of evidence collection that Yin (1994) calls 'participant-observation'. The first offering of the new course was delivered in the second half of 2002 and thus began a series of evaluation research sub-projects.

Stage 1: Analyzing Deep & Surface Learning

The learning objectives of this course clearly demanded an understanding of ideas and meanings rather than merely learning the techniques used in ITPM. An approach to teaching that recognized and encouraged a 'deep approach' to learning was

therefore considered more desirable than the alternative 'surface approach', (Biggs 1987, Marton, Hounsell and Entwistle 1997, Marton and Saljö 1976).

Marton and Saljö (1976) described students as approaching their learning in two qualitatively different ways with this work being expanded on by (Biggs 1987; Ramsden 1992 & Marton, et al. 1997). The approach used by students to 'understand ideas and seek meanings' is referred to as a 'deep approach' and is contrasted with an approach where students see tasks as external impositions with a 'focus being on the words, the text or the formulae without reflection on purpose or strategy'; referred to as a 'surface approach'. The nature of the expected learning outcomes indicated that an approach to teaching that recognized and encouraged a 'deep approach' rather than the alternative 'surface approach' to learning was more desirable.

In the first offering of the course an attempt was made to determine whether the teaching approach being used was contributing to students engaging in deep learning. At the end of the course, students were required to answer three questions in the same type of tutorial format as had been used throughout the semester,

- Describe what this subject has been about.
- What have you learnt about project management?
- What role did the Dag-Brücken case study contribute to your understanding of this subject?

The responses were scanned, looking for indicators of whether a deep or surface approach to learning had been taken by the student. Indicators for a deep approach were specific references to the issues of taking responsibility for a project and the role of the project manager in achieving project success, whereas the indicators for a surface approach were specific references to the individual processes only. The answers to questions 1 and 2 related to the course itself and questions 2 and 3 related to the use of the main case study used within the course. The results from the 19 respondents detailed in Table 1 indicated that the case had not contributed in any significant way to a desired deep approach to learning. The results appeared to confirm Entwistle's (1988) own findings that,

> *" ... few students were able to carry through all the component processes demanded by a fully deep approach which would have resulted in a deep level of understanding", (p28).*

The case study was used as an example of the need to remove the multiplicity of individual tasks in order to focus on the whole. Through the case study the unit had 'pulled apart the complex situations' and had 'kept class discussion grounded upon stubborn facts faced in real life situations' it had apparently indeed failed to 'put it together again before the situations can be understood', (Lawrence cited in Erskine et al. 1981, p11).

Table 1 Summary of Responses to Deep/Surface Learning Questionnaire

Surface Approach	Deep Approach	Surface Use of Case	Deep use of case
14	5	18	1
73.7%	26.3%	94.7%	5.3%

It was concluded from this research that simply using a case study method did not necessarily encourage a deep approach to learning (Jewels and Bruce 2003). Although the published literature had suggested that case studies might contribute to a deep approach to learning, it was not apparent in these findings. If a case study was to be effective in encouraging deep approaches to learning it might need to have characteristics that it had not contained in this iteration. Without an appreciation of precisely how a case method approach will help students reach the desired learning goals, the experience, although likely to be 'interesting' for students, is still unlikely to reliably achieve all desired learning outcomes. The obvious next step was to investigate how a case method might be applied more reliably.

Stage 2: Evaluating the Requirements for Cases

Using a single case study in this way demanded that the case itself be rigorous enough to support all the desired learning outcomes. An investigation into what qualities were required from such cases was undertaken, and the findings compared with those of the actual case study being used in the course.

A literature review indicated that case suitability might be summarized as a function of three components,

- Generic qualities of a case
- The cases applicability to the subject matter being taught
- The cases contribution to the desired overall learning outcomes

An original hypothesis was eventually developed that could evaluate suitability of teaching cases for a particular purpose.

Case Suitability = fn (∑ (generic qualities) , ∑ (applicability to subject matter) , (contribution to expected learning outcomes)) (Jewels, Jones and Ford 2003).

Preliminary evaluation of the original case using this model made it immediately evident that the case would need to be totally rewritten and also presented differently in future offerings of the unit if it was to properly match the three components. To meet this suitability criteria the case was expanded from 5000 to 12000 words with an additional 7000 words of teaching notes. This updated case which was subsequently published as an IS teaching case (Jewels 2003) and appeared to more closely match these components.

The higher level learning outcome was directed towards a better understanding of how a combination of project management issues, when applied homogeneously, are likely to contribute to project success. The unit aimed to teach the fundamental lessons that IT project managers require a range of multidisciplinary skills and that the misapplication of project management knowledge and practices, general management knowledge and practices, or application area knowledge and practices will contribute to project failure.

Stage 3: Embedding the Case Study

At the end of each offering of this course, data was being collected from students to determine whether they had felt 'embedded' within the case using the new format. Although theoretically it appeared as if the case study now met the suitability parameters that had been set for it in stage 2, it was nevertheless imperative to determine whether this had translated into any practical benefit.

As the case method relies for its success on multiple sources of evidence it was believed that adding different forms of evidence to the written word, might provide students with a richer overall background and new perspectives of the situations being examined. Video footage had fortunately been collected throughout the original project and this footage was edited into a DVD that was used to complement understanding of the written case study. A simulator version of the actual GUI/database software used on the project was demonstrated, providing students with the opportunity to witness a tangible output from the project. Although these additional perspectives were found to contribute to students understanding and appreciation of the complex nature of the case the single most influential additional factor introduced into this integrated case study was the involvement of one of the young engineers who had worked on the project. Although the course designer had himself been part of the project team and had provided his personal viewpoints, it was not until the young engineer started presenting guest lectures that students became visibly more interested in the case. The engineer was of the same generation as the student population; and he was still an IT practitioner not just an academic. Students instantly assimilated as they felt that this could have been them, working on an international 'WOW' project (Peters 1999) immediately after graduation.

Examples from the case were ultimately applied to every weekly topic discussed, most of the weekly tutorials used the case as background, and the two written assignments were based around details from the case. The end of semester feedback from students increasingly showed that they were 'bonding' with the case more and more. Additional nuances were being understood and passed on by members of the teaching team, which due to the courses ever increasing popularity had increased to eight instructors.

Although this result had been the original intention for application of the case, there was a downside to embedding students so deeply in a project in which they were told that, *'they needed to smell the pollution of the industrial centre where the project took place'*. The project itself had been a failure and, although in retrospect it should have been anticipated, some students became visibly depressed that they had become involved (albeit tenuously) in a failed project. The format of the final assignment attempts to address this issue by requiring that students write a new project plan that would be likely to contribute towards success of the Dag-Brücken project.

CONCLUSIONS

One of the fundamental learning outcomes in this course is an appreciation of the multi-faceted sides of project success. Cooke-Davies (2002) describes three different types of success, project management success, project success and organizational success through projects. If we ask whether the case method had achieved what it set out to do, i.e use a case

study to assist students in understanding the true nature of IT projects, (without actually being involved in a real-life project), then the method might be considered as successful. This might somehow be equated to project success.

On the other hand, was the method used to deliver this type of case study sound? Did it follow the principles of good teaching, was it pedagogically sound? Certainly it would never have taken the directions that it eventually did without the collaboration of a whole team of egoless individuals who had a single common objective to contribute to good teaching practice. The fact that not one member of the teaching staff ever willingly gave up their roles over a five year period might indicate that this method was 'fun' to use. Members of the teaching team have been the recipients of a faculty teaching award, the course has been the recipient of a vice chancellors university teaching award and the coordinator the recipient of a national teaching award. This might somehow be equated to project management success.

Its contribution to organizational success is however somewhat more difficult to interpret. The course was introduced at the time of a severe decline in IT student enrolments, which ultimately resulted in a severe decline in academic staff numbers. Certainly, the course attracted more external (to the faculty) students than any other course and it did attract, as an elective, more internal students than any other elective. This would have certainly contributed to faculty coffers so from a financial perspective it might be considered to have also achieved organizational success. Yet, although it ultimately became a core subject for the IT degree its future was always in doubt. The course in that format has now been abandoned in the undergraduate program, (though a version is still offered to postgraduates). This may indeed be the manifestation of the different perspectives of IT project management by different factions discussed earlier. Organizational success in this sense may therefore lie in the eye of the beholder. As Maslow (1965) pointed out "For a man with a hammer, every problem becomes a nail".

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