A Study of Cases: Evaluating Requirements

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Abstract

In adopting a pedagogy that attempts to simulate a 'real-world' environment, the School of Information Systems at one university is using an integrated case method approach using a single case study as a core component in its delivery of an IT project management (ITPM) unit. Using any single case study in this manner requires that the case itself be rigorous enough to support the desired learning outcomes. An investigation into what qualities are required from such cases is undertaken, and a comparison made with those of the actual case study being used in the unit, with the intention of contributing towards the development of a model for determining the ideal requirements for cases used in this manner, to support the achievement of learning objectives.

Keywords

IT Project Management, Case Study, IS/IT Education, Pedagogy

INTRODUCTION

Recognising the IT industry's poor project delivery performance (McGunnagle 1995; Dhillon and Backhouse 1996; Lin and Pervan 2001; Hochstrasser 1993), and acknowledging that the modern successful IT project manager needs to apply special techniques (Schwalbe 2002; PMI 2000) that were not being comprehensively covered in the existing curriculum, an 'IT Project Management' unit was offered as an elective in 2002 in a university's postgraduate and undergraduate Information Technology degrees.

The academic appointed to develop the unit and coordinate its delivery had been an IT practitioner with extensive experience of IT project management practices, held project management certified membership of his national computer society, and over a period of 18 months in the late 90's had been actively involved in an IT project for which he had written a case study as part of his post graduate studies. In developing this new unit it was decided to adopt a variation to the more usual multiple case method approach of teaching, by using this single case study as a 'virtual environment' in which it was hoped students would be able to embed themselves. Although still not equivalent to physically being a member of a team in a real project, this 'deep immersion' into an actual case was meant to provide students with experience of the frustrations and elations that are part of most project environments, an appreciation of the real difficulties faced by project team members, and an understanding of the real purpose of the theoretical constructs covered in the unit. The learning objectives of the ITPM unit clearly demanded an understanding of ideas and meanings rather than merely memorising the techniques used to achieve success in ITPM. An approach to teaching that recognised and encouraged a 'deep approach' to learning was therefore considered more desirable than the alternative 'surface approach'(Marton and Saljö 1976; Biggs 1987; Marton, Hounsell and Entwistle 1997).

The effectiveness in meeting desired learning outcomes from using this case method approach, combined with traditional lectures, guest industry lecturers and tutorials, had been measured by analysing responses from a post unit survey of participants (Jewels and Bruce 2003). Although the potential value of using this method of teaching was confirmed, and although students found it 'interesting', the results indicated that regardless of how 'real-life' it may be, its value to students still relies on how it is integrated into a unit curriculum. In particular, it did not seem to encourage a 'deep approach' to learning, appearing to confirm Entwistle's (1988) findings that few students are "able to carry through all the component processes demanded by a fully deep approach which would [result] in a deep level of understanding", (p28).

In choosing to persist with this single case study approach, and taking the Jewels and Bruce (2003) findings into account, the original case was rewritten in an attempt to further assist students to achieve this 'deep level of understanding'. In rewriting the case, various possible qualities that would make a case suitable to encourage such 'deep learning' were considered. The following function was developed to capture the qualities hypothesised as being suitable for a teaching case for a particular unit.

Case suitability = fn (∑ (generic qualities of the case),
∑ (applicability to individual subject matter to be covered),
(applicability to the expected general learning outcome))

In what follows, the justification of the function and its applicability to the revised case study is considered, but first a case for cases is presented.

A CASE FOR CASES

In project management based research conducted in the mid 1990's at Queensland University of Technology, Hicks (1996), citing Kolb (1984) and Zuber-Skerritt (1990), claimed that "experiential learning, action learning and action research are built on the recognition that learning by experiencing and reflecting on that experience can be most effective in helping students and practitioners acquire professional knowledge and skills", (p28). According to Hicks, using this approach helps individuals become reflective practitioners who take responsibility for their own learning and performance over a lifetime. In illustrating that learning consists of multiple elements, Hicks provides an enhanced equation for learning, L = P + Q + ER, where the ER element, "one's own experience reflected on and revised" has been added to the more traditional P (programmed learning) and Q (questioned learning components).

The objectives of the ITPM unit clearly demanded an understanding of ideas and meanings rather than merely learning the techniques used to achieve success in ITPM and so demanded the extra ER element. Case studies may help bring in ER. In their study of the use of case studies, Rees and Porter (2002) list nine potential benefits of using a case method.

- The development of diagnostic skills
- Subject and functional integration
- Deep vs surface learning
- The involvement and motivation of students
- The effective use of class time
- Development of team learning
- The analysis of group discussion processes
- Repeat use
- Review of policy and practice.

These types of benefits were considered to be ideally matched to the goals and objectives set for the unit and reaffirmed the decision to incorporate a case method approach into the pedagogy.

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

According to Barnes, Christensen and Hansen (1994), "Effective cases portray real people in moments of decision, faced with a need to take action and accept its consequences" (p285), and they suggest that as a "second-best" alternative to apprenticeship, good cases permit a "long look over the shoulder of a practitioner at work" (p287).

Further, Lawrence, cited in Erskine, Leenders and Mauffette-Leenders (1981), says of cases, "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." (p11).

However, according to Sauer and Willcocks (1999), the lack of availability of appropriate material is a constraint with using cases in IS. They note that while the life span of cases varies, many lose their freshness quickly, particularly in a fast moving area like IS/IT. It is sometimes more convenient (even necessary) to use cases such as those from Farhoomand and Lovelock (2001) in an IS/IT context; cases developed primarily for use in MBA and executive development courses, which seldom include any IS/IT application component. Whatever the merits of alternatives, such as cases assembled from journalistic press cuttings, or from an interview with the CEO, Sauer and Willcocks' (1999) own conviction is that academically well researched cases, suitably modified, make the best teaching cases. 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).

GENERIC QUALITIES FOR A TEACHING CASE

A case primarily distinguishes itself from other teaching models by its narrative construction and direct approach to problem solving. Within the case form, there are a number of characteristics that define an excellent case study and which could be expected to operate to maximise its teaching and learning impact.

The storyline, or narrative form, of a case study works to engage students' attention and to communicate a complex and multi-dimensional set of teaching points. Cappel and Schwager (2002) maintain that a clear narrative theme or purpose is an essential characteristic of a good case, as is an introductory 'hook' or short attention-grabbing paragraph that defines the central problem of the case. McNair, cited in Erskine et al. (1981) promotes the use of narrative elements such as timing and plot to create an interesting sequence of events that unfolds for students, like a story: ".. for the case to be a really living thing and for the student to forget that it's artificial there must be drama, there must be suspense" (p85). Wood and Anderson (2001) analyse the learning impact of the narrative form and claim it effectively involves the "cognitive skills of application, analysis, synthesis, evaluation, metacognition, conscientization and reflection" (p3). The authors link this higher-order level of learning with research into the area of hemisphericity, or the activation of the verbal/logical learning of the left brain as well as the visual/affective functioning of the right brain. They argue that the story-telling aspect of successful cases stimulates both the visual or imaginative processing of the brain as well as its logical capacities enabling a student to mentally hold "an image or series of images for later analysis and reflection" (p3).

Realism is also identified in the literature as a desirable quality for teaching cases. In researching student perceptions of case incidents in higher education, Wright (1996, p22), discovered that student interest in the case rose if they were told that the case incident was true. Cappel and Schwager (2002) suggest that this may also be the case of fictional cases if they 'feel real' to students. Realism, actual or simulated, can be achieved in a number of ways; most obviously, through the currency of the subject matter. This is a particularly important feature of information systems cases because they are located in an industry in which systems and business applications are rapidly outmoded.

Quotations are recommended by a number of case writers (Sauer and Willcocks 1999; Cappel and Schwager 2002; Rees and Porter 2002) as a means of injecting energy and realism into a case story. In addition to the characterisation created by direct speech, quotes effectively present the different, and often conflicting, views of the case's key actors and enable readers to empathise with both the work-place situation and the case's central characters: "Cases are made more real and absorbing by the appropriate use of quotations from key players in the company described" (Sauer and Willcocks 1999, p214). Some difference of opinion exists about whether supporting company data, such as performance figures and accounts, are best inserted into the body of the case to enhance realism (Cappel and Schwager 2002) or included in appendices (Sauer and Willcocks 1999).

At the heart of a good case study is a professional problem or set of problems that need solving. The case method enables students to develop realistic solutions to problems and to understand the crucial nature of accurate diagnosis both specifically and generally (Rees and Porter 2002). Active learning such as this increases "the motivation to learn in many students" (Bonwell & Eison cited in Cappel and Schwager (2002)). Appraisal or descriptive cases that present past events and decisions for evaluation may not achieve the same intensity of learning as the action-oriented learning format of cases that require students to examine a problem, develop alternative solutions, and select and justify the best course of action.

Student perceptions of the qualities of a successful case seem to echo those of academic practitioners, as discussed above. A survey of first year students and faculty at the Harvard Business School (Bennett & Chakravarthy cited in Erskine et al. 1981, p85) concluded that students and staff believe that a good case:

- Tells a story
- Focuses on an interest arousing issue

- Is set in the last 5 years
- Permits empathy with the central characters
- Includes quotations from company sources
- Presents only issues that face working MBA's
- Requires appraisal of decisions already made
- Requires solution of management problems
- Teaches a management skill
- Is 18±5 pages in length, not including exhibits
- These desired qualities are the foundation on which a good IT teaching case is built and will, to a large degree, ensure its success as a teaching and learning tool.

APPLICABILITY TO SUBJECT MATTER

Apart from having appropriate generic qualities, a suitable case needs to be applicable to the particular subject matter to be covered. Even though a subject has general, high level, learning outcomes, various issues need to be delivered separately. The issues to be covered in the unit in which the case is being used are given in Figure 1.

Week	Topic
1	PM & ITPM Description & Roles
2	Stakeholder Analysis
3	Business Cases & The Methodological Approach
4	Team Dynamics, Conflict Resolution
5	Communication Practices
6	Cultural Issues, Change Management
7	Life Cycles, Using a Methodology
8	Scoping and WBS
9	Metrics and Estimation
10	Risk Management
11	Quality Management
12	Knowledge Management
13	Post Implementation Reviews

Figure 1 ITPM Weekly Topics

The case is delivered to students in two parts; the first containing issues relating to the environment in which the project took place and the second describing events that actually occurred within that environment. The first (environmental) part of the case study is used specifically to cover the first six topics. The remainder of the case study (the operational component) was used in association with the environmental part to provide examples of the practical application of the last seven topics, attempting to show how more appropriate decisions are made and problems solved by relating the problem to a specific context or environment.

APPICABILITY TO EXPECTED GENERAL LEARNING OUTCOME

Although the various issues in Figure 1 need to be covered, the higher level learning outcome for the unit was ultimately directed towards a better understanding of how a combination of project management issues, when applied homogeneously, are likely to contribute towards project success.

Current literature suggests that achieving project success appears to be at the heart of what is considered to be the role of the project manager. The project manager is described by Nicholas (2001) as the single person who is accountable for the project and who is totally dedicated to achieving its goals. Cadle and Yeates (2001) state, "As a project manager, you are determined to succeed and to bring your project to a successful conclusion – on time, within budget and to the customer's satisfaction" (p356). Although the achievement of success clearly figures prominently in defining a project manager's role, the so called "hard" skills such as methodologies, processes and tools, which appear to be the emphasis of many current project management training approaches, may not contribute to success as significantly as so called "soft skills" (Mulally 2002). Murch (2001) concurs

that projects generally do not fail because of the lack of adequate technology, even though there may be concerns about whether the technology chosen is the right one, stating, "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" (p.17).

Factors contributing towards success and failure are given in the popularly cited Standish Group reports, (Schwalbe 2002; Cadle and Yeates 2001; Murch 2001; Nicholas 2001), as shown in Figure 2.

Rank	Factors for Successful Projects	Factors for Challenged Projects	Factors for Impaired Projects
1	User involvement	Lack of user input	Incomplete reqs.
2	Executive management support	Incomplete requirements	Lack of user involvement
3	Clear statement of requirements	Changing reqs. and specs.	Lack of resources
4	Proper planning	Lack of executive support	Unrealistic expectations
5	Realistic expectations	Technology incompetence	Lack of executive support
6	Smaller milestones	Lack of resources	Changing reqs and specs.
7	Competent staff	Unrealistic expectations	Lack of planning
8	Ownership	Unclear objectives	Didn't need it any longer
9	Clear vision and objectives	Unrealistic time frames	Lack of IT management
10	Hard-working focused team	New technology	Technology illiteracy

Figure 2 - Rankings of Successful, Challenged and Impaired Projects
Source The Standish Group CHAOS http://www.standishgroup.com/visitor/chaos.htm

The high level expected learning objective of the unit was to teach students, through the use of the case study and the coverage of various issues, how to increase the likelihood of success by providing an understanding of

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

The actual delivery of a complex learning outcome to students who may up to that time have studied only technical subjects, is likely to present an interesting challenge. It was considered imperative that students first understand that ITPM encompasses considerably more than merely managing the technical issues associated with an IT project. The unit therefore attempts to teach the fundamental lessons that

- modern IT project managers require a range of multi-disciplinary skill-sets in order to increase the likelihood of project success and
- the absence or misapplication of any one of the knowledge areas described by the PMI (2000)
  - generally accepted project management knowledge and practices
  - general management knowledge and practices
  - application area knowledge and practices

  will contribute towards project failure.

Defining success in IT/IS projects has been the topic of much research and subsequent debate. As Pinto and Slevin (1988) suggest, "How can we truly assess the outcome of a project when we (in the project management field) cannot fully agree on how project success should be determined" (p67). Their often cited work attempts to identify critical success factors at various stages across the project life cycle that are likely to contribute towards project success, yet they still do not explicitly attempt to define overall project success. Although Cooke-Davies (2002) still addresses the issue of which factors are critical to project success, he follows the distinction made by de Wit (1988) between project success and project management success and adds corporate or organisational success to the criteria. Rather than attempting to define success it was convenient to adopt the three types of success suggested byCooke-Davies (2000, 2002):

- Project Management Success
- Project Success
- Organisational Success through Projects

and to indicate *throughout* the unit which level(s) were being addressed as each component or issue was discussed. Note that the expected general learning outcome of understanding how a combination of project management issues, when applied homogeneously, are likely to contribute towards project success requires a holistic, systems method.

THE DAG-BRUCKEN (DB) ASRS CASE

Background

In 1996 an agreement was made, between a well-known beverage manufacturer and an Australian electrical engineering company, to provide an automated storage and retrieval system (ASRS) facility in Asia. The case study was originally written as part of the first author's post-graduate studies describing how the lack of software quality assurance (QA) processes might have contributed to the project's ultimate failure. It was subsequently rewritten to describe more comprehensively how the organisation's broader IT development processes, and the environment in which the processes were conducted, might have contributed to the ultimate failure of the project and to the eventual failure of the organisation. For confidentiality reasons, the names of the principal parties were changed, but the case covered real events documented by one of the project team members, providing an example of the special mode of evidence collection that Yin (1994) calls 'participant-observation'. The 19 page (11,000 word) case study provided contextual details of the environment in which the project took place, stakeholders' varying expectations of the project, individual component requirements, resource availability, the development processes applied, and cultural and communication factors relevant to the project. The case study follows the IT development portion of a 20 month project, from its initial requirements stage through to the ultimate demise of the organisation that had failed to deliver the project objectives.

PRESENTATION OF THE CASE

Two different types of student case study are described by Summers and Smith (2003, p61):

- The short case study (also referred to by Wright (1996)as 'case incidents')
- The Harvard MBA style case study

Unsure of which type would provide the best learning outcomes, a Harvard MBA style case study was supplemented with 'case incidents' covering individual issues derived from the case study, such as team communication and conflict resolution, which were then discussed in weekly tutorial sessions.

The case was presented to students in two parts; the first containing issues relating to the environment in which the project took place and the second part describing events that actually occurred within that environment.

The 'environment' section was presented to students in the 1st week of the semester, with the 'operational' section presented only after students had completed a mid-semester assignment. Allowing students to develop their opinions based only on information contained within the first section gave them the opportunity to develop, within the constraints of the case study's project environment, their own development strategy, using principles discussed in the lectures, but without being unduly influenced by knowledge of what had actually occurred, and failed. They were, in essence, allowed to make the same errors that had been made in the actual project; although it is important to emphasise that they were not penalised for making such errors. In encouraging a move from a position of dependence towards greater independence (Marshall and Mill 1992), students were encouraged to 'take risks' and 'to be creative' in their responses, which would have been more difficult if they had already known that a particular development strategy had been unsuccessfully tried. Immediately following the completion of this assignment, the second part of the case was presented and an in-depth analysis of the reasons why the case strategy had failed was undertaken with students. Whenever, within the theoretical lectures, it was necessary to cite an example of topics such as risk management, quality management, estimation, scoping or knowledge management, a reference to the already established environment of the case was provided. The case therefore provided a framework in which the practical applications of individual project management concepts could be better explained and experienced by students.

EVALUATION OF THE CASE

Generic Qualities

Case suitability = fn ($\sum$ **(generic qualities of the case),**
$\sum$ (applicability to individual subject matter to be covered),
(applicability to the expected general learning outcome))

The literature associates excellence in case studies with a narrative construction, realism and a direct approach to problem solving (Cappel and Schwager 2002; Rees and Porter 2002; Sauer and Willcocks 1999; Wood and Anderson 2001; Wright 1996). The ASRS case study exhibits each of these characteristics.

The ASRS case develops as a narrative through time. Beginning with the Taiwanese order for an aisle changing crane system in 1996, the case identifies the marketing forces that shaped the project's scope, IT components,

human resources and skills base, contractual conditions and software development process. In this first part, the project looks to be reasonably well planned and on track for success. The case then leads students through the ensuing difficulties encountered by the project. It portrays the growing concern of the individual developers, the fragmentation of the project teams, management's inability to grapple with the underlying issues and the final fiasco of an inadequate testing plan. The emerging 'story' of the project aims to catch students' attention and create an intellectually engaging framework into which readers can situate new information and added complexity. The multiple actor views of the worsening project status provide a 'real life' feel to the case and presents students with the layered perspectives of the project team members and management and an insight into the reasoning behind the decisions that were made.

Sauer and Willcocks (1999) advocate the use of quotations to strengthen the sense of realism in a case; this has not occurred in the ASRS study. While quotations are an interesting device that add texture and character identification in a case, they can only be collected as a study is being documented. The ASRS case study was written some time after the events it records and consequently does not include personal quotes or other contemporaneous communication. Students of the case are however in no doubt as to its reality; its authenticity is apparent in its business, technical and project detail.

Rees and Porter (2002) argue that the core of a good case is a set of professional problems that need solving. The ASRS case is designed to promote thought and learning by presenting such professional problems. Throughout the case, students are confronted with project management problems and conflicts that are clearly threatening the project's success. At the same time, they are being equipped in lectures and tutorials with the knowledge they need to resolve these issues. At a mid-point in their course, students are required to combine the knowledge gained from lectures and tutorials in order to identify ASRS project management issues and potential solutions; at this point students have only received the first section of the case study. This staged release of information introduces a sense of suspense or drama (McNair cited in Erskine et al. 1981)) into the teaching process and, more importantly, concentrates the learning focus on direct problem solving.

The Dag-Brücken case clearly has appropriate generic qualities, according to the academic literature on case studies. Further, compared with the faculty and student perceptions of the qualities of a good case study found by the Harvard Business School, it satisfies eight of the ten elements for case study success. According to these criteria, and those defined by the literature, the ASRS case study can be judged as a sound example of a case teaching model with good generic qualities.

Applicability to Subject Matter

Case suitability = fn ($\sum$ (generic qualities of the case),
$\sum$ **(applicability to individual subject matter to be covered),**
(applicability to the expected general learning outcome))

PM and ITPM Description and Roles

In describing the DB management team, the case discusses why successful project managers from one discipline, such as mechanical or electrical engineering, may be unable to naturally adapt to an IT project management role. It discusses also how organisational competency in one discipline does not necessarily transfer into competency within another.

Stakeholder Analysis

The various stakeholders are introduced into the case by describing how each stakeholder had their own perspective on what was likely to contribute to success and how each believed they could contribute towards that success. The lack of user involvement, specifically in terms of the contract negotiations not involving client IS/IT departments, and the creation of strategic, tactical and even operational IT plans by a DB management team containing no-one with commercial IT experience provides the foundation for a number of resulting issues.

Business Cases and The Methodological Approach

Significant emphasis is placed on the business reasons behind the project, although the business case is never explicitly stated. As the ASRS concept is relatively unknown outside the warehousing/logistics industry, it was necessary to provide fairly specific details on how the system was supposed to operate.

Team Dynamics and Conflict Resolution

The absence of any genuine contractual performance requirements until almost the end of the project combined with the original decisions by management, created a number of dysfunctional relationships, no methodology to handle disputes with the client, and no change management procedures. The case thus provided the foundation for introducing the concept of proactive rather than reactive management practices into the subject.

Communication Practices

The decision to separate the project plan into functional areas and to subsequently create separate teams to develop each function is described in the case as an example of a bottom up development approach that created competition between the teams to successfully complete their own modules first while at the same time failing to provide an environment where the teams cooperated towards achieving an integrated end product. The failure to communicate between teams was shown to have resulted in unhealthy competition and a 'knowledge hoarding' mentality.

Cultural Issues, Change Management

As a follow on to the communication practices, the case discusses how the culture of the project team affected its ability to integrate its components successfully, but raises the issue of how individual developers were still prepared to make enormous contributions by working extraordinarily long hours, in spite of the eventual realisation that they were on a "death march". The inability of the vendor to adjust their processes when they realised that the project was not proceeding normally and their insistence right to the end that software engineering was 'little more than programming' is highlighted. Their belief that simply 'throwing more programmers at the project' would solve the problem leads into the organisational issue of using full time and contracted part time staff together, whilst introducing some ethical issues.

Life Cycles, Using a Methodology

The case serves to highlight issues affecting both the R and D stage of development in Australia and what was supposed to be only the on site implementation stage in Taiwan. Again the case highlights the differences between IT project management and other forms of project management in having different requirements in the planning, developing and testing stages. The absence of an integrated development plan is shown to result in an inability to select an appropriate development methodology for the project and subsequently an inability to provide a clear statement of requirements, no milestones at which to genuinely assess progress and a failure to understand whether the people involved had the required skills to complete their tasks.

Scoping and Work Breakdown Schedules (WBS)

Inadequacies in the planning stage, the selection of inexperienced staff and a misunderstanding of the role of software engineering, are shown to contribute to the inability to provide either an overall project scope, the scope for each team and subsequently a clear vision and objectives. For this leading edge project, WBS's could never be adequately provided by developers with no experience in the technology being used and no clear understanding of how each person's role integrated with the final product. In essence, the case describes how 'no-one knew what they didn't know'.

Metrics and Estimation

Extending the concept of the stakeholders not understanding the processes in which they were engaged, the case goes on to describe how the use of smaller milestones may have contributed towards project success. It discusses how providing individual developers with ownership of more than just their own small functional parts may have allowed the project team to provide more accurate estimates for their own work as well as for integrated functions.

Risk Management

As the case clearly shows that the vendor had not performed a risk management assessment, only the effects of not undertaking one can be demonstrated. However, the case illustrates clearly how many decisions and actions taken by the vendor might have been different if even a basic risk assessment had been undertaken. The incorrect choice of development methodology, the failure to integrate individual components and the selection of inappropriately skilled staff are shown to be associated with the absence of a risk management strategy.

Quality Management (QM)

The original case study was prepared within a post graduate programme to evaluate how the vendor's lack of QM processes contributed to the project's ultimate failure and retains much of the character of the original work. The case demonstrates ISO developed strategic principles of modern quality management, i.e. customer satisfaction, preferring prevention to inspection and recognising management responsibility for quality; thus providing examples of the common misperception that the quality management function is an add on rather than embedded within the development plan.

Knowledge Management (KM)

The culture of the vendor organisation and certain tactical and operational decisions made by management are shown to have created an environment where it was difficult for developers to share knowledge with other

stakeholders. The absence of any form of formal knowledge repository, together with examples of the vendor discouraging informal communications are shown to contribute to situations where the same mistakes were regularly repeated, resulting in failures to modify strategies that were clearly not working.

Post Implementation Reviews (PIR)

Because the project never reached a 'stabilisation' stage, no PIR was ever conducted, yet the reasons for conducting a PIR are tacitly embedded within the case by linking it to other projects that the vendor was still working on and the reality that PIRs can be used as much for the project managers own knowledge of what worked and what did not work. The issue of identifying different types of success is revisited and the ultimate risk of project failure discussed.

Summary

Each of the individual topics covered in the weekly lectures could be related back to the case study. The case thus provides a method of demonstrating all the individual components discussed and could therefore be judged as applicable to all the individual subject matter.

Applicability to Learning Outcomes

Case suitability = fn ($\sum$ (generic qualities of the case),
$\sum$ (applicability to individual subject matter to be covered),
(applicability to the expected general learning outcome))

When evaluating case suitability, matching the contents of the case against the individual topics covered makes evaluation of applicability to subject matter relatively easy. However, given that the expected general learning outcome requires a holistic, systems method, and is not treated as one unit of subject matter, evaluation is more difficult. However, the case study does present examples of the three knowledge areas that are, according to the PMI (2000), required by project managers to successfully carry out their roles. Moreover, there has been an attempt not to segregate these areas but to embed them homogeneously into the case in a similar manner in which project managers must deal with issues in real-life situations. Similarly, the case content areas have been presented in an unstructured format, not simply presented one topic after another, but discussed randomly and usually embedded within a situation that requires the student to first identify what type of topic is being addressed and filtering out any irrelevant issues. Further, the different types of success suggested by Cooke-Davies (2000, 2002) are noted throughout the unit as each issue is addressed. On these grounds, the case does seem applicable to the expected general learning outcome of understanding how a combination of management issues, when applied homogeneously, are likely to contribute to project success; with an understanding of factors likely to contribute to project success as well as project failure.

With the case now revised to more fully satisfy the proposed case suitability function, it is hoped that students would show a 'deep level of understanding' when surveyed after completion of the unit and that they would respond in a positive manner to the question "W*hat role did the case study have in contributing to your understanding of this subject?"*. Hopefully, they will show that they have achieved the expected learning outcome and do not simply list the different topics that were covered week by week.

CONCLUSION

It would seem that the case fares well when the case suitability function is applied to it: comparison of the case study against identified preferable generic qualities of cases, its applicability to the individual subject matter to be covered, and its applicability to the expected general learning outcome suggest that it is suitable for its purpose. However, future research is needed to determine the extent to which the case actually encourages the desired 'deep level of understanding'. It may be that this 'deep learning' ultimately relates to how deeply students embed themselves in the case; that merely presenting a relevant, rich, complex and interesting case does not in itself guarantee any commitment from the students.

The generic qualities of the case and the applicability of the case to individual subject matter appear to rely essentially on the content of the case. The component of the hypothesised function that deals with the applicability of the case to the expected general learning outcome is not so simple because it is a higher-level component: it requires synthesis on behalf of the students, not merely the understanding of one presented topic. It may be that the contribution of this component relies on how that content is presented and delivered to students, how it is linked to assessment, and how much students are willing to embed themselves into the case.

The proposed function does at least provide a good basis for evaluating the suitability of a case. Using the function to analyse the revised ASRS case suggests that it is a highly suitable case. Additional investigation is

required to assess possible 'deep learning' outcomes resulting from the use of such a case. Any shortfall from the hoped-for outcomes should lead to further development of the hypothesised function.

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