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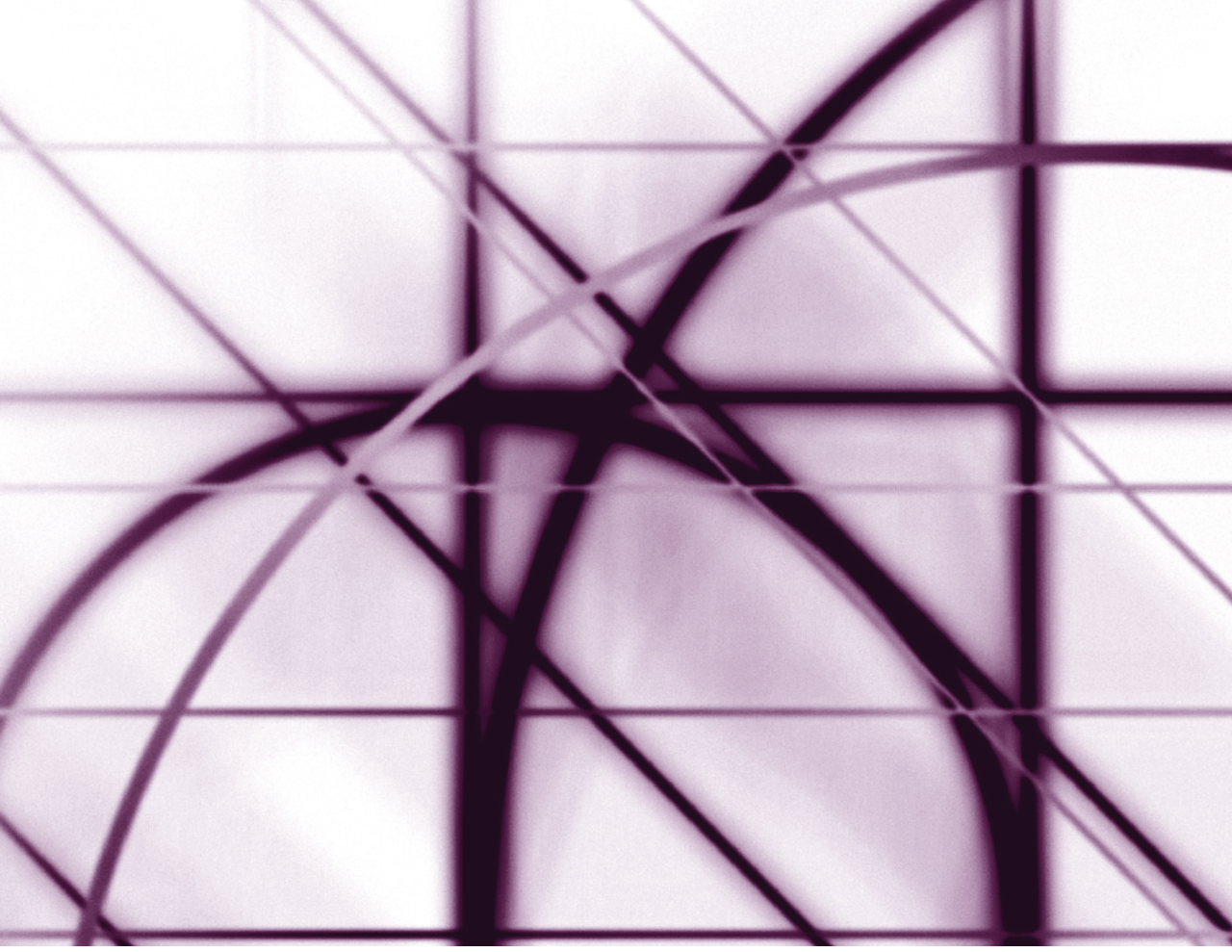
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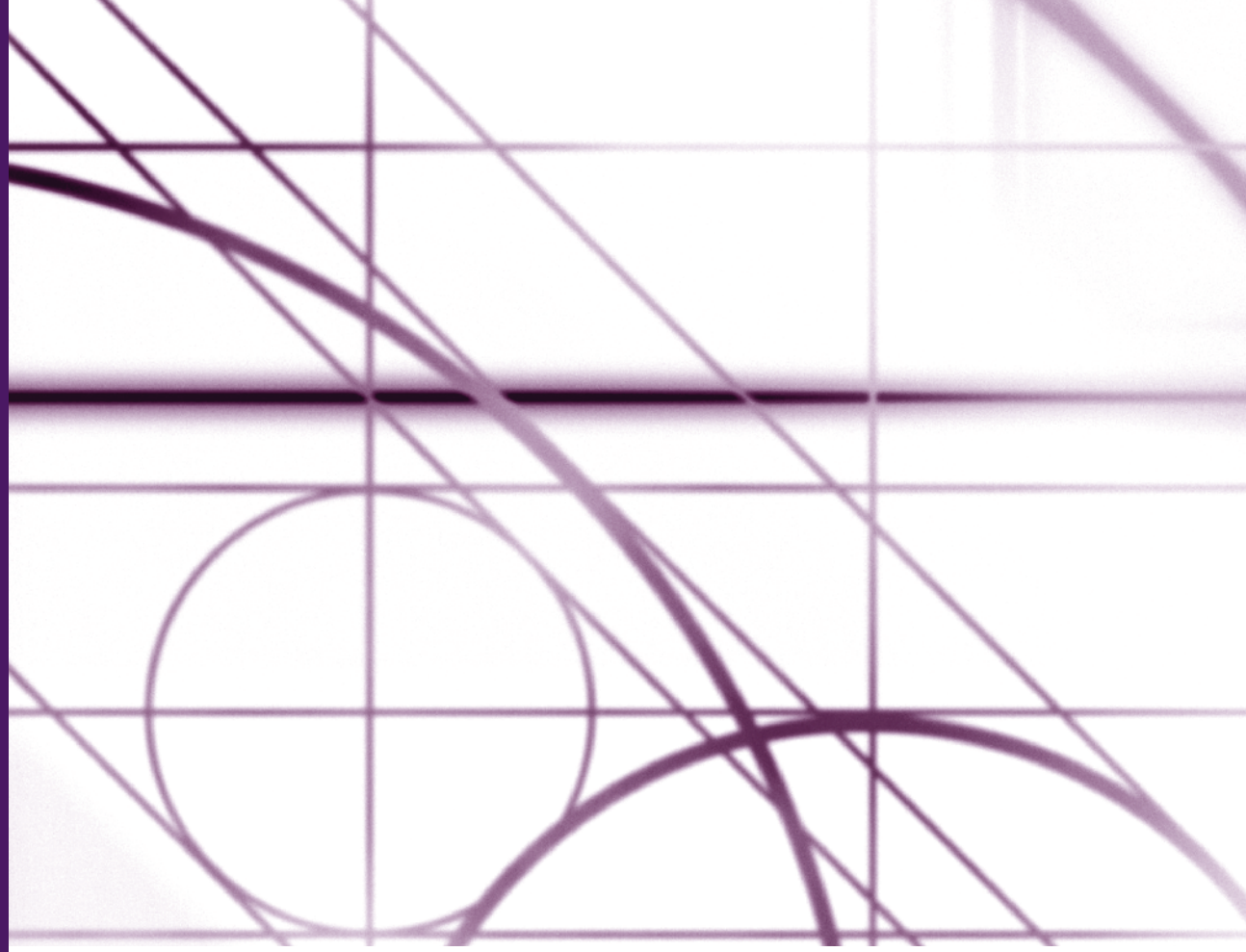
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Improving Lessons Learnt Outcomes in Multi-phase Project Environments



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IMPROVING LESSONS LEARNT OUTCOMES IN TIME-CRITICAL PROJECT ENVIRONMENTS

By
Paul Anthony Fuller

A dissertation thesis submitted in partial fulfilment of the requirements for the award of the degree Doctor of Engineering (EngD), at Loughborough University

February 2011

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ABSTRACT

The capture and beneficial application of learning from past experiences in projects has been an area of interest and debate for many years. The implementation of lessons learnt is commonly acknowledged as difficult. Existing studies point to the deficiencies in current practice but few propose practical approaches to improve the situation. A key barrier to learning in projects is the time-critical nature of most projects which makes the creation of time and space to learn and then apply the resultant learning problematic. Other inhibitors include the variety and temporality of project teams, the geographical spread of many projects and client pressures to reduce costs.

The aim of this research was to improve project learning processes in multi-phase project environments through the identification and application of relevant organizational learning and knowledge management theories. The research was based on a single company longitudinal case study in an infrastructure support services organization. An event-based approach to project lessons was developed which focuses on benefits realisation and measurement. The processes employed overcome some of the key barriers to the effective capture of lessons learnt and their subsequent implementation i.e. shortage of time, different learning styles of individuals, lack of effective capture mechanisms, poor articulation of benefits realisation, lack of management sponsorship.

A model was also developed which acts as a multi-faceted lens which aids the understanding of the dynamics of project-based learning. The model was tested through a series of workshops. In order to assist the roll-out of the new approach across the case study organisation and outline implementation guide that has been developed. The approach can also be promoted externally to improve project management practice across the wider construction industry. In addition, the study also revealed that event-based enactment of complex/abstract theories can be used as a tool to create improved praxis by overcoming the need to explain the theories to the actors involved.

The main contribution to research is the development of a new approach which extends existing theory in the areas of learning, knowledge management and boundary objects in multi-phase project contexts. It achieves this through the synergistic use of the theories employed which support the development of reflective practitioners with the skills to engender a 'learning how to learn' culture within project-based environments. Further testing of ongoing benefits monitoring and establishing causality is needed. Overall, the methodology developed is highly adaptable and can be used by others in different organizational contexts to improve organizational learning, business performance, client satisfaction and wider stakeholder outcomes.

KEY WORDS

Boundary Objects, Knowledge Management, Lessons Learned, Organizational Learning, Project Management

PREFACE

This thesis has been prepared in part fulfilment for the award of an Engineering Doctorate (EngD) through the Centre for Innovative and Collaborative Research (CICE) based at Loughborough University. It represents the research carried out between 2006 and 2010 and was undertaken in an industrial setting. This study was partly sponsored by Mouchel Plc, a leading UK-based infrastructure support services organization.

The Engineering Doctorate programme offers a radical alternative to a traditional PhD course of study. It is, in essence, designed to provide researchers and industry with the opportunity to carry out doctoral level research in an industrial context. The aim is to provide innovative solutions to challenging engineering problems that benefit both the sponsoring organization and wider industry.

The EngD is examined based on a thesis that consists of a discourse supported by a number of papers published during the course of the research. The latter describe in more detail the work carried out. A minimum of one journal paper and two conference papers either published or accepted for publication is required. In this case the discourse is supported by three conference papers and one journal paper which are included in the appendices. The papers should be read in conjunction with the discourse to provide the reader with a better understanding of the research undertaken.

ACRONYMS / ABBREVIATIONS

CICE	Centre for Innovative and Collaborative Engineering
EngD	Engineering Doctorate
ERP	Enterprise Resource Planning
KM	Knowledge Management
KPI	Key Performance Indicator
OED	Oxford English Dictionary
OGC	Office of Government Commerce
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PRINCE2	Projects in Controlled Environments
RE	Research Engineer
UK	United Kingdom

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LIST OF PAPERS

The following papers, included in the appendices, have been produced in partial fulfilment of the award requirements of the Engineering Doctorate during the course of the research.

PAPER 1

Fuller, P. A., Dainty, A. R. J., Thorpe, T., Slater, I. (2007) Learning Organizations: Can they be shown to exist through the realization of benefits, *In: Boyd, D. (Ed) Proceedings of the 23rd Annual Association of Researchers in Construction Management (ARCOM) Conference, Belfast, 3-5 September 2007, Vol. 2, pp.713-714.*

PAPER 2

Fuller, P.A., Dainty, A. R. J., Thorpe, A. (2008) Using Measurement as an Enabler for the Implementation of Knowledge Management and Learning Processes, *In: Harorimana, D. and Watkins, D. (Eds.) Proceedings of the 9th European Conference on Knowledge Management, Southampton, 4-6 September 2008: pp.201-208.*

PAPER 3

Fuller P. A., Dainty A.R.J., Thorpe A. and Bentley, D. (2010) Overcoming challenges in applying learning theory to projects through learning praxis. *In: Anumba, C.J., Bouchlaghem, N.M., Messner, J.I. and Parfitt, M.K. (Eds.) Proceedings 6th International Conference on Innovation in Architecture Engineering and Construction, Penn State University, USA, 9 -11 June 2010: Sect.1, pp.1-10.*

PAPER 4

Fuller P. A., Dainty A.R.J. and Thorpe A. (2010) Improving Project learning - a new approach to lessons learnt, *International Journal Managing Projects in Business* Vol. 4 No.1, pp. 118-136.

ADDITIONAL PAPERS (NOT INCLUDED IN THESIS)

Fuller P. A., Laurent, S.L., Dainty A.R.J. and Carrillo, P. (2008) Exploiting and measuring learning potential Improving Project learning - a new approach to lessons learnt. *Proceedings of the CIB W102 Conference on Information and Knowledge Management in Building, Helsinki, June 3-4 2008 Finland, pp 106- 116.*

Fuller, P.A., Dainty, A.R.J., MacDonald, R., Thorpe, A. (2009) Event-based measurement of learning in projects, *In: Dainty, A. (Ed) Proceedings of the 25th Annual Association of Researchers in Construction Management (ARCOM) Conference, 7-9 September 2009, Belfast, Association of Researchers in Construction Management, Vol. 2, pp.713-714.*

OTHER PUBLICATIONS (NOT INCLUDED IN THESIS)

Fuller, P.A., (2010) Improving project learning and the time barrier, *Innovation and Research Focus*, Thomas Telford, London, Iss.83 November 2010 p.5.

1 BACKGROUND TO THE RESEARCH

1.1 INTRODUCTION

This chapter presents the background to the research undertaken as part of a four-year Engineering Doctorate (EngD) programme. It provides an introduction to the general field of study, an outline of the research context, the problem being addressed, a statement of the scope, aims, objectives and the justification for the research within an industrial context. In order to provide clarity and direction to the reader the structure of the thesis is then explained. In addition, a synopsis of each of the four papers published during the research is given and it is intended that these papers should be read in conjunction with this discourse (Appendices 1 – 4).

1.2 LEARNING IN PROJECT-BASED ORGANIZATIONS

The capture and application of lessons from past projects has been an area of interest and debate for many years. This has resulted in many of the best practices being incorporated into industry methodologies (e.g. PRINCE2 (OGC, 2009) and made available in knowledge bases (e.g. PMBOK (PMI, 2008)). However, in project-based organisations learning lessons from past projects and actually implementing the learning successfully on future projects is commonly acknowledged as difficult to achieve (Anbari et al, 2008, Carrillo, 2005; Julian, 2008; Newell et al, 2008; Sense, 2007; Schindler and Eppler, 2003; Tan et al 2008, von Zeditz, 2002; Williams, 2004). Finding new, more appropriate ways to capture and embed learning emerging from projects is important, therefore, to developing mitigations for recurrent problems which can occur in such environments.

Some of the major factors inhibiting learning and the capture lessons learnt in a project context are: the wide variety of actors involved; the dispersed geographical nature of large scale inter-site or global projects (Sapsed and Salter, 2004); their temporary nature (Keegan & Turner, 2001); and, the variety of forms of project-based organizations (Sydow et al, 2004). A key enabler for improving project delivery is the ability to learn from existing activities and use this learning to continually improve and innovate whilst delivering a quality service or product to clients (Carlile, 2004). Another major factor is the time-critical nature of most, if not all projects, that makes the creation of the right conditions for learning and then applying that learning, problematic. A shortage of time to engage in this vital activity is often stated as one of the main barriers to successful application of lessons in practice (Keegan & Turner, 2001, Julian, 2008). There is also ever increasing pressure from clients to complete projects on time, to budget, and to the right quality.

The research seeks to address the problems that organizations face in trying to capture and implement lessons learnt in time critical project environments. A key aspect is the need to fully justify the time spent on this activity where the focus is on completing the task in hand rather than improving future projects.

1.3 THE RESEARCH CONTEXT

1.3.1 THE AUTHOR

The overall domain of this research is in the field of implementing Organizational Learning across an organization and how the relevant theories might be applied to aid the development

of a Learning Organization culture. The main unit of analysis covered the knowledge flows around/within projects in the Business Unit where the Research Engineer (RE) was based. The project participants were studied as embedded units of analysis. During the initial review of the literature a number of other broadly related research areas were explored including dynamic capabilities, learning organizations, knowledge management and boundary objects. As a result of this examination, and testing several learning theories in practice, the topic of improving project-based learning evolved as the focus for the research.

1.3.2 THE INDUSTRIAL SPONSOR

The main vehicle for the research was a single company in the support services sector with the research activities undertaken in a major division delivering services to public sector clients involved in Highways (i.e. the Highways Agency and Local Authorities). Due to the rapidly changing nature of the market and the company itself the RE's role changed several times during the course of the research. It was possible, however, to accommodate these changes and successfully adapt the research accordingly.

The case study organisation had been growing rapidly and was moving from a traditional construction/engineering consultancy based operation towards a professional support services and business process outsourcing delivery model. The overall delivery mode, however, remains project-based although there was a trend towards larger 'bundled services' contracts. These changes meant the company needed to maximise the knowledge and learning from delivery of projects and services. This research was aimed at developing an approach that supports this situation by implementing lessons learnt processes, which result in improved project outcomes. It also addresses the industry drive for more effective and efficient project management processes to overcome frequent high profile project overruns in terms of both time and cost which occur in both the public and private sectors.

The main focus for the research was a large scale IT-led transformation project which involved the implementation of a business-wide Enterprise Resource Planning (ERP) software application. This was a business critical project with demanding targets for completion of the various phases. The researcher was seconded onto the project as a Subject Matter Expert covering the Highways Division's interests across the entire implementation lifecycle. During the project opportunities were identified to apply theories of knowledge and learning arising from the research in order to further refine the approach being developed.

1.4 AIM AND OBJECTIVES

In the early stages of the research a broad-based aim and objectives were set which were then refined during the course of the research to ensure that the work remained closely aligned to the needs of the business and the role of the RE.

1.4.1 OVERARCHING AIM

The main aim of this research is to improve project learning processes in multi-phase project environments through the identification and subsequent application of relevant organizational learning and knowledge management theories. The research focuses on engendering greater ownership of lessons learnt processes by project team members and increased sponsorship from management for their implementation through an emphasis on benefits realisation.

1.4.2 OBJECTIVES

The specific objectives for the research were:

1. To review existing research on learning in project-based organizations in order to identify potential models for informing learning practice within the support services environment.
2. To critically evaluate existing project learning processes within Mouchel.
3. To develop a practicable time-efficient approach to capturing lessons learned and benefits measurement in multi-phase project environments.
4. To develop and validate approaches for propagating project learning across the wider business.
5. To generalise a new theoretical framework for the application of learning theory in project-based environments.

In addition, to add to the body of knowledge in the fields of learning organisation culture led change, knowledge and learning capture/dissemination and methods for measurement of benefits.

1.5 JUSTIFICATION AND SCOPE

1.5.1 JUSTIFICATION FOR THE RESEARCH

Project-based organizations are continually seeking to operate more efficiently and deliver projects on-time, to budget and to the correct quality. The need to improve and learn from past projects is of ever increasing importance. Research shows that this is at best inconsistent both within organizations and across industry (Fuller, 2009 and Paper 4 Appendix 4).

In the context of the sponsoring organization, support services are provided to public sector and regulated industry sectors. These services are generally delivered on a project basis and include civil engineering, infrastructure management, business process outsourcing, project management and management consulting. The performance and the quality of the service provided and the sustainable competitiveness of the business are largely down to how effectively projects can be delivered and challenges met. One of the key enablers for this is the ability to learn from existing activities and apply this learning to continually improve and innovate whilst delivering a quality service to clients.

The organization's ambitious growth strategy was based on its ability to manage acquisitions, expand the core business sectors and win larger bundled services contracts. During this period of rapid growth maintaining the performance and the quality of service provided to clients and their end users was the key to continued success. This, in turn, depended upon the growth of knowledge assets that were, and in some respect still are, not fully understood by the organisation. Leveraging the considerable knowledge-base and learning that the business had concerning its past performance and responses to market changes was essential in sustaining growth whilst maintaining and improving levels of service.

There was, therefore, an opportunity to carry out a case study on a single organisation in the construction/support services sector covering the development & implementation of elements of a learning organisation culture. The case study approach allowed the research to be tailored to the needs of the business and its operational environment.

1.5.2 SCOPE OF THE RESEARCH

The project scope addressed the needs of a sub-unit of the case study organization in the area of project delivery. The sub-unit was the Highways business stream of the case study organization where the RE was based. This unit has over 3000 staff based at 100 offices and sites in the UK and Ireland delivering highways design and maintenance services to the Highways Agency and Local Authority clients. The body of research was focussed on the development of new, more effective, learning processes to improve the delivery of multi-phase projects and the resulting client outcomes. The new approach was targeted towards bringing about the practical application of complex learning concepts to improve project management practice and increasing the level of benefits realisation.

1.6 STRUCTURE OF THESIS

Chapter 1 gives an introduction to the research project, outlines the general subject domain, identifies the overall aims and objectives, and provides a justification for the research in an industrial context.

Chapter 2 provides a review of existing work undertaken out in the domain and demonstrates the novelty of this particular research.

Chapter 3 reviews a range of typical research methodologies and outlines the adopted methodological approach along with the reasons for their selection.

Chapter 4 provides a detailed description of the research undertaken to meet the aims and objectives.

Chapter 5 presents the key findings of the research, highlights the originality and contribution to existing theory and practice, identifies the impact on the sponsor and the wider industry, provides a critical evaluation of the research and makes recommendations for areas of further research. A final overall summary and conclusions is also included.

A full list of references is included immediately following chapter 5.

Appendices 1 - 4 cover the four peer reviewed papers that support this research. These papers are integral to the research and should be read in conjunction with this thesis.

1.7 SYNOPSIS OF PAPERS

A short outline of the papers included in this dissertation is given in Table 1 below.

Table 1: Synopsis of papers

ID	Title	Journal/Conference	Status	Description
Appendix 1 Paper 1	Learning Organizations: Can they be shown to exist through the realization of benefits	Proceedings of the 23rd Annual Association of Researchers in Construction Management (ARCOM 2007)	Published	This paper investigates the concept of Learning Organizations and examines whether measurement of benefits can be used as evidence that organizations can learn in a meaningful and beneficial way.
Appendix 2 Paper 2	Using Measurement as an Enabler for the Implementation of Knowledge Management and Learning Processes	Proceedings of the 9th European Conference on Knowledge Management, (ECKM 2008)	Published	This paper examines the common barriers to the implementation of knowledge management and learning. It reveals how measurement can be used as an enabler to overcome some of these.
Appendix 3 Paper 3	Overcoming challenges in applying learning theory to projects through learning <i>praxis</i>	Proceedings 6th International Conference on Innovation in Architecture Engineering and Construction (AEC-Innovation 2010)	Published	This paper outlines the development of an event-based approach to lessons learnt capture and implementation in project-based contexts. It uses an emphasis on <i>praxis</i> to promote successful outcomes in this field.
Appendix 4 Paper 4	Improving Project learning - a new approach to lessons learnt	International Journal of Managing Projects in Business (In press)	Accepted	This paper reports on how the concept of 'boundary objects' can be mobilised to better understand and improve the processes involved in project learning.

2 REVIEW OF EXISTING RESEARCH IN THE DOMAIN

2.1 INTRODUCTION

This section outlines the literature covering the key concepts involved in this study. The main areas investigated included Organizational Learning, Learning Organizations, Knowledge Management, Intellectual Capital and relevant Project-based learning studies. The review of the literature was an ongoing process and the initial literature review was used to assist in the formulation of the research questions (see section 3.3.2) used in the course of the research. The review was revisited as part of the preparation for each phase of the research. This section should be read in conjunction with the literature review sections of the papers in Appendices 1-4.

2.2 ORGANIZATIONAL LEARNING AND LEARNING ORGANIZATIONS

Two of the early researchers in the field of organisational learning were Argyris and Schön. They put forward the key concepts of single loop learning; double loop learning theories-in-use; and, espoused theory. Single loop learning is where errors are detected and corrected but the organization continues with their current policies and goals. Double loop learning occurs when error is detected and corrected in ways that involve the modification of an organization's norms, policies and objectives. Theories-in-use are the mental maps which guide interpersonal behaviour, the behavioural worlds we live in, our effectiveness and capacity for learning rather than the theories people explicitly espouse which are theories-of-action (Argyris and Schön, 1974: 2-4).

As a result of their collaboration they proposed a conceptual bridge between individual and organisational behaviour which resulted in the following definition of organizational learning:

“Organizational learning occurs when members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory-in-use, and embedding the results of their inquiry in private images and shared maps of the organization” (Argyris and Schön, 1978: 29).

They went on to describe the concept of duetero-learning as occurring when organizations' members learn from previous learning activity i.e. applying organizational learning concepts to the learning process itself. This leads to a focus on analysing reasons for successes and failures from which the barriers to learning can be identified. Strategies can then be developed to overcome these barriers which are then communicated to the individuals in the organisation and implemented.

“When an organisation engages in duetero-learning, its members learn, too, about previous contexts for learning. They reflect on and inquire into previous contexts for learning. They reflect on and inquire into previous episodes of organizational learning, or failure to learn. They discover what they did that facilitated or inhibited learning, they produce these strategies, and they evaluate and generalize what they have produced. The results become encoded in individual images and maps and are reflected in organizational learning practice” (Argyris and Schön, 1978: 27)

In another study by Argyris (1992) a conflict was identified arising from the way in which individuals use their defensive reasoning processes. He found that what individuals said they believed (i.e. their 'espoused values') and what they really believed and did as a result (i.e. their 'theories in use') could be quite different. This was found to lead to unintended outcomes as a result of this conflict. In terms of implementing organisational learning he argued that, in his view, there are three main challenges that can be drawn from the literature: that organizational learning is contradictory; it is not always beneficial; and, are real organisations capable of learning productively? (Argyris, 1992: 1). This research develops a practicable methodology for addressing some of these challenges within a project-based context.

Resulting from this work a field of research developed which examined the implementation of Organisational Learning and the creation of learning organisations. A key practitioner was Peter Senge who defined learning organisations as:

“...organisations where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together” (Senge, 1990: 3).

There has also been significant discussion over the years concerning individual vs. institutional learning as outlined by Easterby-Smith et al (2000) and Pedler (1995). The latter raised the importance of individual and organisational learning. He suggested that it is important to consider not just what learning is carried out but how it is done and how an organisation intends to use the learning at all levels, individually and collectively, including wider stakeholders. Hedberg (1981) suggests that

“..although organizational learning occurs through individuals, it would be a mistake to conclude that organizational learning is nothing but the cumulative result of members' learning. Members come and go, the leadership changes, but organizations' memories preserve certain behaviours, mental maps, norms and values over time”.

Mental models are one of the five 'disciplines' proposed by Senge (1990) as essential to the successful creation of a learning organisation.

Brown and Duguid (1991) examined the emergence of practice as a unit of analysis to explore learning and knowing which provides a bridge into knowledge management. The focus moved to studies at the organizational level and is moving even further to encompass studies of learning across boundaries (Scarborough et al, 2004) and between organisations (Bresnen & Marshall, 2000). This raises the important issue of learning across organisational boundaries both within and between organizations, which was explored in relation to the concept of boundary objects by Star and Griesemer (1989). They suggested that boundary objects provide a means of 'translation' whereby the same knowledge and information is used by different actors who have diverse perspectives and views about the information being generated and how it should be used and interpreted.

These studies demonstrate the complex and often abstract nature of the theories involved in organizational learning and the importance of boundaries. This element of the review informed the development and answers to the research questions relating to identifying the key theories and current practice in the field.

2.3 PROJECT-BASED LEARNING

A study by Keegan and Turner (2001) investigated project based learning practices in a change management context across nineteen European companies in a variety of industries. They concluded that three of the key barriers to learning in project-based firms are time pressures, centralization and deferral. Although they found increasing numbers of initiatives to try to overcome these issues the quality of the practice was poor and there was not enough time available for project teams to reflect on their experiences.

The lack of poor practice was also identified by von Zeditz (2002) who examined how post project reviews could be used as a tool for organizational learning in Research and Development (R & D) settings. The study of twenty-seven R & D managers across a number of industries and countries revealed that only one in five R&D projects were reviewed after completion and, of those, few had established review guidelines. In the case of projects that were abandoned most were not reviewed for causes of failure.

A review of project learning methods by Schindler and Eppler (2003) produced a number of results relevant to this research. They investigated how project knowledge was managed or 'harvested' within nine multi-national organizations in the industrial and service sectors. They identified a number of success factors: regular capture at important milestones; use of a neutral moderator; collective interactive evaluation of lessons; use of graphics with outputs in a poster format; commitment to action with an outline plan; and person with responsibility for their implementation. These can then be used to both institutionalize and integrate lessons learnt activities into project management processes and phases in order to propagate continuous project learning. In a similar vein Sense (2007) examined the need to create the right environment for learning in projects as part of a larger change programme. A model was proposed consisting of five sociological elements: cognitive styles; learning relationships; pyramid of authority; knowledge management; and situational context. He proposed that using the framework practitioners

"can structure a situated learning environment within their projects through communally analysing, critically reflecting upon and developing learning actions relating to the five sociological elements...". (Sense, 2007)

This will assist in individuals 'learning how to learn' a phrase contained in the Senge (1990) definition of a learning organisation.

Anbari *et al* (2008) investigated how knowledge management and learning are linked in the context of project review processes. They examined why post project reviews in the literature are generally believed to be beneficial but that in practice are not conducted in a consistent manner. They concluded that 'regular collection of lessons learnt in projects, their careful storage in the organizations historical information data base, and their meaningful utilization in subsequent projects are critical elements of project success and organizational competitiveness. They also proposed areas for future study which are addressed in this research: who is best qualified to lead reviews the team leader or an expert at debriefing? ; what metrics or other empirical data can be employed to carry out cost-benefit analysis of post project reviews?

The role of Project Management Office (PMO) leaders in facilitating lessons learnt across projects was investigated in a study by Julian (2008). He looked at the failure to embed past project learning in new projects leading to the re-solving of problems again and again. The study was based on interviews with twenty PMO leaders whose responses were validated by a number of focus group sessions. He presented three main conclusions. The first is that PMO leaders act as 'knowledge brokers' who transfer learning back into the system by modifying procedures, structures and systems to embed the learning in new projects. The second is that using changes in organizational routines can embed lessons learned through improved methodologies. The third is that defensive routines (Argyris, 1992) can inhibit the learning from previous projects particularly if there is a blame culture leading to what was termed 'red light' learning. Four recommendations were made in respect of PMO leaders. The first called for PMO leaders to act as knowledge brokers across multiple communities through a 'network of relationships built on trust, professional development and mutual understanding'. The second called for equal emphasis on good projects as well as poor projects. The third addressed the need for reflection on lessons over the whole project lifecycle not just at completion. The final recommendation recognised the need for an independent facilitator to create the right conditions for reflective activity by actors. In particular, this should assist in minimising the adverse effects of defensive routines.

These studies helped to understand the issues surrounding to project learning and provide insights into how the research questions concerning the development of new approaches may be addressed. The last three recommendations in the study of PMO Leaders by Julian (2008) are of particular relevance to the research undertaken.

2.4 MEASUREMENT

Measuring the benefits that may result from implementing organizational learning has not been covered comprehensively in the research literature. Case studies have been written but there is scant hard evidence in terms of quantifiable 'bottom-line' benefits of implementing organizational learning. Overall there is a lack of empirical studies exploring this important topic (Jashapara, 2003; Lopez et al, 2005; Prieto and Revilla, 2006). Typically, key performance indicators have been used as the main method of measuring benefits of learning. This can lead to difficulties in establishing 'cause' and 'effect' and the exact impact of any changes that are made. This is particularly relevant where there are a number of different areas of improvement being implemented with multiple impacts across the business which may lead to some duplication of the effects. This can be addressed by using empirical methods of measurement, with each individual area of improvement being recorded and the resulting savings aggregated to give an overall value of the benefits accruing from the improved project learning. These can then offer a transparent trail to enable particular interventions to be evaluated against their performative outcomes.

The approach outlined in this research focuses on project-based learning and developing a culture that encourages the measurement of the resulting benefits in projects within the RE's business unit which formed the main unit of analysis. Örtenblad (2005) highlighted the need to consider levels of analysis when examining organisational learning. In this case, the project team members and users working on the major change-based IT system roll-out across the case study organisation were embedded units of analysis. The scope of the pilots was also widened across the business stream to include other project based activities (e.g. structural

engineers and management development programme members) which were also used as embedded units of analysis. The use of sub-units of analysis allows for a more detailed level of enquiry (Yin, 2003). For more details on units of analysis see Section 3.2. As described earlier, the approach proposes to empirically derive the value of implementing lessons learnt from project reviews by monitoring the results from individual instances of applying the lessons learnt by team members and other stakeholders.

2.5 KNOWLEDGE MANAGEMENT

A key element of any learning process is the transformation of tacit knowledge into explicit knowledge and vice-versa. Nonaka and Takeuchi (1995:71 - 72) developed a model of organizational knowledge creation which used the Socialization-Externalization-Combination-Internalization (SECI) concept of knowledge conversion (see figure 2.1).

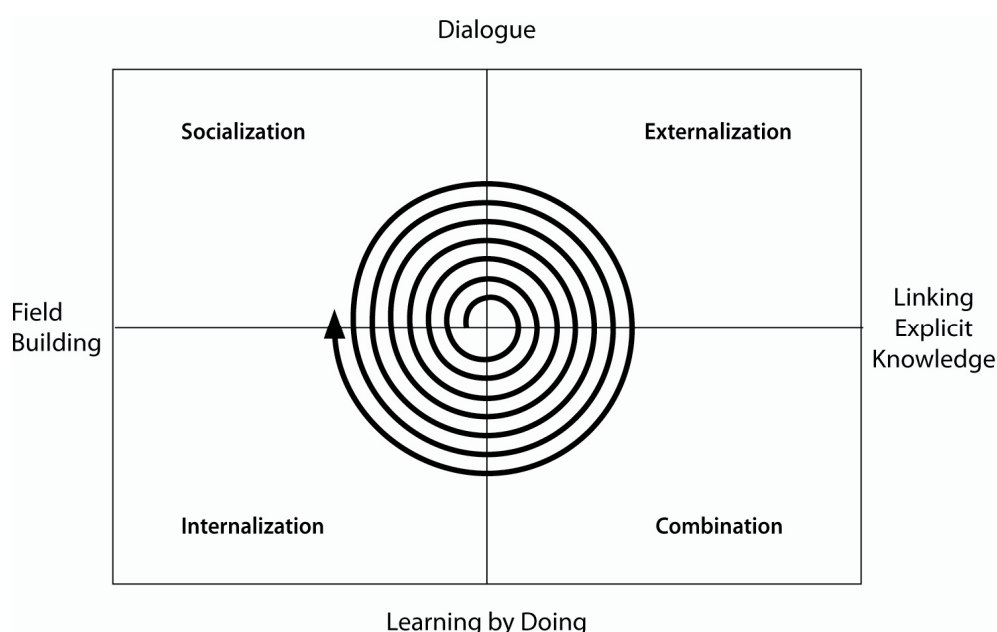


Figure 1. SECI model of knowledge conversion (c.f.Nonaka and Takeuchi, (1995, p.71)

The concept consists of four modes of knowledge conversion. The first mode is ‘socialization’ which builds a “field” of interaction where the actors share experiences and mental models. The second mode, ‘externalization’ is where dialogue and/or collective reflection help the actors to articulate their tacit knowledge which is normally held within the mind and not easy for others to access. The third mode, ‘combination’, is triggered by networking newly created knowledge with existing knowledge. The final mode, internalization, is enabled through “learning by doing”. The approach adopted in this research is aimed at improving the capture and implementation of learning generated through project reviews that are designed to take the actors through the four SECI modes.

This concept was further developed by Nonaka et al (2000) to include the concept of ‘ba’ which concerns the ‘conditions’ under which knowledge conversion takes place. They defined it as;

”.... a shared context in which knowledge is shared, created and utilized. In knowledge creation, generation and regeneration of ‘ba’ is the key, as ‘ba’ provides the energy, quality and place to perform the individual conversions and move along the knowledge spiral”

This creation of the right environment links with the work of Owen (2008) who developed the open space technology concept, originally developed for running a conference. The approach promotes ‘self-organizing’ events where the participants decide on the number of sessions, topics for discussion, speakers, timescales and they can ‘vote’ which events they attend and for how long using the ‘law of two feet’ i.e. leave events and go to others at any time. The aim is that by the end of the event the following has occurred; every issue of concern has been tabled; all issues were discussed to the extent agreed by the participants; a written account of discussions is produced and circulated to participants; issues are prioritized in order; any critical issues are identified and actions to deal with them agreed.

The research outlined above emphasises the need for the right ‘environment’ or ‘conditions’ for learning to be successful. It also provided some of the techniques employed in the approach to improve *praxis* that were developed and tested by the research. The Oxford English Dictionary (OED, 2005) definition of *praxis* is ‘practice, as distinguished from theory’. The researchers view is that a better definition in the context of research is ‘the process of bringing theory into practice’. This aligns more closely with the definition used by Zuber-Skerritt (2001) in his publications covering research into action learning and action research. His definition was ‘.... The interdependence of and integration – not separation- of theory and practice, research and development, thought and action’ (Zuber-Skerritt, 2001: p.15). The literature in this section contributed to the inclusion of the research question covering the investigation of *praxis* as a means of improving project learning across organizations (see section 3.3.2)

2.6 BOUNDARY OBJECTS

The concept of ‘boundary objects’ was first examined by Star and Griesemer (1989) in a study which investigated how the tensions arising from the different viewpoints of various groups of actors and the need for generalized findings can be addressed. In their case the Berkley’s Museum of Vertebrate Zoology was the organization studied. They concluded from their research that two things were necessary, ‘standardized methods’ and ‘boundary objects’. The latter are defined as being ‘both adaptable to different viewpoints and robust enough to maintain identity across them’ (Star and Griesemer, 1989: 387). A key attribute of boundary objects is that they act as a means of translation which is used in the approach developed to both encourage and propagate the implementation of the learning that occurs. They observed that boundary objects are those objects which are:

- plastic enough to adapt to local needs and the constraints of the parties using them
- robust enough to maintain a common identity across sites
- weakly structured in common use
- abstract or concrete

- given different meanings in different worlds
- commonly structured making them recognisable to actors in more than one world
- capable of acting as a means of translation (c.f. Star and Griesemer, 1989)

They identified four types of boundary object; repositories where objects are kept in an ordered manner for use by many types of actor; ideal types which take the form of generalized descriptions i.e. a drawing or similar that is deliberately vague to allow adaptation for individual use; coincident boundaries which describe objects that have a common boundary but have different ‘internal’ contents; and standardized forms which are objects that allow common communication across different work groups (Star and Griesemer, 1989: 410). In the context of this study, boundary objects would appear to offer a conceptual explanation of how knowledge and learning can be translated in practice via learning events. Used in this way, such events can mediate information across key boundaries which exist amongst actors, in projects, across organisations and in supply chains. A recent study by Koskinen and Mäkinen (2009) examined the role of boundary objects in the negotiation of project contracts. They highlighted the importance of visualization for reaching shared understanding and suggested boundary objects as an example. In this research visualization of some types of boundary objects (i.e. benefits realisation cards – see example in Table 9) is used and forms an important feature of the event-based approach that has been developed.

The review of the knowledge management literature revealed the difficulties in transferring knowledge (and learning) between differing actors and across organizational boundaries. The concept of boundary objects also provided a ‘lens’ to observe the event dynamics, outputs produced and wider outcomes. The research question on the communication of existing theory was aimed at overcoming these difficulties (see section 3.3.2).

2.7 OVERCOMING BARRIERS

A challenge to propagating a learning culture is that many opportunities result from errors or failure with which practitioners do not wish to be associated. Argyris (1992) suggests that potentially embarrassing or threatening errors can become a key barrier to learning at all levels in organisations. He proposes that practitioners take the axiomatic view that there are enablers that can be implemented to bring about the requisite learning. Interventions are, therefore, required in order to create the conditions that will enable learning organisations. This suggests that propagating and maintaining a learning organisation culture needs to be proactively managed rather than left to develop organically.

A number of studies have investigated barriers to learning in detail and have identified culture as the most significant challenge (McCann and Buckner, 2004; Mason and Pauleen, 2003; Delong and Fahey, 2000; Carrillo et al, 2004). In the construction sector, a study by Carrillo et al (2004) reported: a lack of standard work processes; a shortage of time; organizational culture; lack of finance; employee resistance; and poor IT infrastructure as particularly significant in this regard. A more recent study (Chinowsky & Carrillo, 2007) added poor business case/financial benefits, lack of focus and an unstable workforce as militating against learning within such organizations. Identification of these barriers assisted the researcher in the development of the new approach by adopting a more structured approach to benefits

capture and realisation. This work informed further the research question formulated to investigate the role of *praxis* in overcoming these barriers (see section 3.3.2).

2.8 SUMMARY OF CONTRIBUTION TO RESEARCH

Existing research in the field of project lessons learnt tends to inhabit particular fields of research mainly related to projects themselves and knowledge management. There are many critical studies which point out the deficiencies of current practice and the reasons why these occur. Few studies, however, look to mobilise theories and concepts which can contribute not only to understanding learning in project contexts better, but also to improve the processes of learning and, in turn, practice in the field.

This work is positioned at the nexus of three different but related literatures. The areas which have been identified as having particular relevance are Organizational Learning, Knowledge Management and Boundary Objects. The research develops a pragmatic flexible approach to improving project lessons learnt that organizations can use in other contexts to improve organizational learning, business outcomes and overall performance. It also seeks to answer the question of how to make existing theory more understandable in project contexts. It achieves this by providing a model which builds on existing concepts and their graphical representations. The model developed also provides a multi-faceted lens for other researchers to use in studying the field of learning and applying lessons in multi-phased projects.

3 RESEARCH METHODOLOGY

3.1 INTRODUCTION

The selection and development of a research design is a key starting point for any research. Cresswell (2009 p.3) defines research designs as “...plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis”.

3.2 METHODOLOGICAL CONSIDERATIONS

According to Cresswell (2009) there are a series of decisions that need to be made in order to select which design should be used for the study of a particular topic. The factors informing these decisions are the researchers’ own worldview i.e. his ontological beliefs and associated epistemology; the research strategies to be used; and methods of data collection, analysis and review. Other factors influencing the decisions are the type of problem being studied, the personal experiences of the researcher and the actors and stakeholders involved in the study. It is important for the researcher to determine the philosophical position he chooses to adopt. In order to achieve this, the RE read around this subject to better understand what this actually means to an individual.

The RE concluded that he was most closely aligned to a pragmatic worldview which is derived from Pierce, James, Mead and Dewey (Cresswell, 2009). This provides a philosophical basis for research that: is not committed to one philosophy; gives individual researchers a choice i.e. freedom of choice of methods, techniques and procedures that will best meet the needs of the research; does not view the world as an absolute unity; is based on truth at the time of observation; is based on the ‘what and how and where the research is intended to go; occurs in contexts that are social, historical, political etc; and is based on a belief in an external world as well as that held in the mind (Cresswell,2009). In summary, pragmatism can be described as providing a basis for research that examines the consequences of actions, is problem-centric, pluralistic and real-world practice oriented.

The researcher needs to not only select the methods that he will use but the type of study that will be conducted. There are three types of basic research design available: qualitative; quantitative and mixed methods. Cresswell (2009) refers to these as “strategies of inquiry” and he provided a useful summary reproduced below.

Table 2: Alternative Strategies of Inquiry (Cresswell, 2009 p.12)

Quantitative	Qualitative	Mixed Methods
Experimental designs Non-experimental designs, such as surveys	Narrative research Phenomenology Ethnographies Grounded theory Case study	Sequential Concurrent Transformative

In deciding which overall strategy or method to use Yin (2003) provides a useful comparison of five main strategies used in social science research; experiment, survey, archival analysis, history and case study. He examines each of these against three conditions that need to be taken into consideration when selecting which to use and it is quite appropriate to use a blended strategy approach when carrying out case studies.

Table 3: Relevant situations for different research strategies (Yin, 2003 p.5)

Strategy	Form of Research Question	Requires Control over Behavioural Events?	Focuses on contemporary Events?
Experiment	how, why?	Yes	Yes
Survey	who, what, where, how many, how much	No	Yes
Archival Analysis	who, what, where, how many, how much	No	Yes/No
History	how, why?	No	No
Case study	how, why?	No	Yes

Case studies may employ multiple sub-units of analysis (also known as embedded units of analysis) which can facilitate a more detailed level of enquiry. This is most relevant in studies where the overall aim is to describe the features, context and process of a phenomenon. It is particularly applicable to this study where the contextual boundaries are not clear and a richer data set can be generated to aid understanding of the phenomena (Yin, 2003).

The topic of triangulation is also important in terms of data collection, analysis and interpretation (Fellows and Lui, 2008; Yin, 2003). This means that multiple sources of data should be used in order to provide a wider range of issues to be addressed e.g. past history, people's attitudes and behaviours. The most significant advantage, according to Yin (2003), is the way in which this type of approach develops convergence of the various lines of enquiry which contributes to establishing the validity of the research.

3.3 RESEARCH DESIGN AND METHODS USED

3.3.1 OVERALL RESEARCH STRATEGY

In terms of the research undertaken in this study the abstract nature of the topic i.e. knowledge and learning, meant that quantitative methods were unlikely to be practical. At the outset it was anticipated that the use of mixed methods may have been a suitable research strategy. However, during the course of the research it became apparent from the nature of the data and the small sample sizes that only qualitative methods were able to be employed.

A single organization case study approach was selected as the main strategy of inquiry. The main unit of analysis was the Business Unit the RE was based in, with embedded units of analysis formed by the project team members in the various projects covered by the study. This was due to the context in terms of the nature of the Engineering Doctorate program

where the researcher is embedded in the organization and the research (ideally) becomes part of their everyday duties. This aligns with Cresswell's description of case studies

“...the researcher explores in depth a program, event, activity, process, or one or more individuals. These cases are bound by time and activity, and the researchers collect detailed information using a variety of data collection procedures over a sustained period of time (Stake, 1995)” (Cresswell, 2009:13)

Another definition of the case study method by Yin (2003) demonstrates the applicability of this strategy to the research undertaken which investigates learning and its measurement in an organizational context. His definition is more technical and is in two parts. Firstly, a case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Secondly, the case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points and as one result relies on multiple sources of evidence, with the data needing to converge in a triangulating fashion. Another result is that it benefits from prior development of theoretical propositions to guide data collection and analysis. (c.f. Yin, 2003 pp.13-14).

The adoption of this strategy also allowed the researcher some flexibility in selection of methods and techniques to use in following his course of inquiry that would from the outset be likely to (and in fact did) change over time. Throughout the research triangulation was used as a tool to test validity of the research findings. It also ensured convergence and rigor in the whole research process.

There are drawbacks in adopting the case study method and Yin (2003) highlighted that some researchers do not hold case studies in very high esteem compared to other methods. The main concern appears to be lack of rigor as other strategies have methods and procedures to guide the researcher. The concern is that bias can be applied to favour the researchers' views and this must be guarded against by reporting all evidence fairly. Another concern is the ability to generalize scientifically from a single case study which he answers as follows “...the case study, like the experiment, does not represent a “sample” and in doing a case study, your goal will be to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization)” (Yin, 2003: 10). In the research reported here one of the aims was to produce a model which draws upon existing theories.

3.3.2 RESEARCH QUESTIONS

In the pursuit of the aims and objectives of the research (outlined in section 1.4) the following research questions were formulated based, in part, on the outcomes of literature review:

- What are the key learning and knowledge management theories that apply to project-based organizations?
- How is organizational learning and knowledge management currently applied in practice?
- What theories and approaches can be used to propagate duetero-learning in project environments?

- How can an event-based approach with a benefits focus be used to overcome barriers to project-based learning?
- How can *praxis* aid the development of improved lessons learnt in projects across organizations?
- How can existing theory be communicated in a more understandable manner?

Note: *Praxis* is used in the context of making transparent the way in which knowledge (theory) is turned into practice.

3.4 METHODS USED

Having chosen a longitudinal case study as the overall methodology to be employed appropriate supporting research methods needed to be selected for each of the research phases and these are outlined in the following section. (See Figure 3 and Table 4 in Section 4 for a summary of the final research methodology and overall plan)

3.4.1 LITERATURE REVIEW AND ARCHIVAL ANALYSIS

A literature review is the fundamental starting point of any research method and it is important that any new research project builds on previous activities that are relevant in that particular field of study (Cresswell, 2009). Carrying out a literature review helps to: define the problem; understand what has previously been studied; see what methodologies have been used before; identify key theories, gaps and shortcomings. The review of the literature and relevant theories should be critical and objective (Fellows and Lui, 2008). It also establishes the relative importance of the new study and provides benchmarks for comparing the results obtained with earlier studies (Cresswell, 2009).

In Phase One an initial review of the literature and related work in the field was undertaken and included contextual studies on project-based organizations. The key objective was to provide the RE with enough knowledge and information to carry out the initial scoping of the study, determining an initial personal viewpoint for the research and then planning how it would be executed (Blaxter et al, 2006; Hart, 2001; Yin, 2003). During this period personal development activities were undertaken to improve the RE's research and management skills through taught modules.

In addition, a wider archival analysis was carried out to review more generalized information found in company documents, newspapers, industry publications, websites etc. (Yin, 2003). This was supplemented by dialogue with various case study company staff to understand the business context and also to build up a picture of the existing organizational learning activities in the case study organization. One of the primary data collection tools to aid the capture of this information was the use of 'mind maps' to provide a richer insight. An example is shown at Figure 2.

analysis dependent on the sample size and population. A formal survey is a highly structured instrument based on a questionnaire that is sent out to target respondents with the aim of gaining quantitative data in order to carry out statistical analysis (Fellow and Lui, 2008).

In this study it was originally decided to adopt a mixed methods approach in the form of a questionnaire survey to carry out quantitative analysis and a series of semi-structured interviews to obtain qualitative data. However, in the case of the former the small sample size did not allow quantitative analysis therefore qualitative thematic analysis was used to analyze the data obtained. These low response rates are common with postal questionnaires (Fellows and Lui, 2008).

Two surveys were carried out in the third phase of the research which covered the development of the new event-based project learning processes designed to improve the capture, dissemination and implementation of lessons from projects by promoting measurement of benefits.

The first, an electronic survey was carried out using a proprietary web-based tool. An electronic questionnaire was sent out to all 30 attendees of the event-based project learning workshops by email. The aim of the survey was designed to provide feedback that would supplement the researcher's observations on the effectiveness of the approach and it also allowed participants to respond after having time to reflect on the event. The survey instrument used is described in more detail in Appendix E. The results were analysed using a thematic approach which grouped the responses in various basic categories or themes. The findings from the analysis are described in section 4.3.

The second survey was a programme of semi-structured interviews. These were carried out in order to triangulate the results further and improve the validity to the results. The targeted participants were experienced practitioners in order to allow their views to be compared with the findings of the research on lessons learnt and benefits realisation on projects. This survey was carried out through a series of face-to-face interviews towards the end of Phase 3. A template analysis approach was adopted for this element of the research (King, 1998). The participants were selected from a target list of 46 practicing Project Management Professionals across a range of industries including the public sector, support services, architects and consultants. The sample selection was based on the following criteria: only one person interviewed from any one organization; a mix of experienced (5 or more years) and more recent project managers; and practitioners outside the construction/civil engineering sector would be included.

The interviews were all recorded and subsequently transcribed verbatim. The researcher took notes during the interviews using hand-drawn mind-maps to allow rapid capture of information and provide a means of checking transcripts for accuracy. Template analysis was used to process the data to identify relevant themes arising from the interviewee's responses. This type of thematic coding is described by King (1998) as being mid-way between content analysis (Weber, 1985) where codes are all pre-determined and grounded theory (Glaser and Strauss, 1967) where there are no a priori codes. The act of producing a template and subsequent coding should only be used as a starting point that assists the researcher in developing a rich account of the findings (King, 1998).

The main steps in template analysis are: define a priori themes (if appropriate), initial coding, produce initial template, develop template, interpretation and writing up findings (King, 1998). In this instance, the first set of codes used in the analysis were a priori codes as the titles for some of the questions and this approach is endorsed by King (1998) as the best starting point. As recommended by King (1998) a fellow researcher with experience of thematic coding was used to review the approach to coding and the resulting suggestions were used to refine the analysis. A spreadsheet was used to compile the template for coding of the transcripts from the interviews. Following this the data under each heading was examined by the researcher for themes. These were highlighted and summarised (see section 4.4 for more details and analysis of the results). One of the main purposes of the analysis was to identify how the event-based approach dealt with the issues raised in the interviews.

3.4.4 THEORY DEVELOPMENT

Case studies can be used as a basis for generalizing to theoretical propositions in a similar manner to the way experiments generalize to populations (Yin, 2003). He argues that the goal of a researcher carrying out case study research should be to extend and generalize theory through analytic generalization rather than enumerating frequencies (statistical generalization) used in experiments.

The final phase (four) covers this area and describes the development of a project learning model that can be used to better understand and explain how the complex theories and abstract concepts operate in a project-based learning environment. See section 4.5 for details of this activity.

3.4.5 ACTION RESEARCH

A key feature of action research is that the theory is "grounded in action" (Eden and Huxham, 1996) which establishes the validity of the research. In this case approach based in improving *praxis* is being developed which aligns with these principles by using action in the form of events where the participants are facilitated by the researcher to enact the theories being applied.

3.4.6 VALIDITY AND RELIABILITY

In case study research there are four widely used accepted tests for establishing the quality of the research (Yin, 2003).

- *Construct validity*: This covers the establishment of the correct operational measures for collecting evidence. The construct validity can be increased by using a number of tactics which include use of multiple sources of data, using key informants to review outputs and establishing chains of evidence.
- *Internal validity*: This applies to studies which establish causal relationships and deals with the avoidance of spurious effects. The tactics for dealing with this include pattern matching, explanation building, addressing rival explanations and use of logic models.
- *External validity*: This test deals with the generalization of the findings outside the study undertaken.

- *Reliability*: This is concerned with the goal of minimising the errors and biases in a study. Documentation can be improved through the use of case study protocols and plans. The objective is that a later investigator should be able to arrive at the same findings and conclusions.

The research design incorporated elements of all the above tests using a variety of approaches and methods to increase validity and reliability levels which are covered in the four papers in the appendices and this section of the thesis. In particular, multiple sources of data, pattern matching and good documentation were used. The overall validity and reliability of the study is discussed specifically in Section 5.8.

3.4.7 OVERALL RESEARCH METHODOLOGY

The resulting combination of the adopted methods into a robust overall methodology and the key research activities is shown diagrammatically in Figure 3 below.

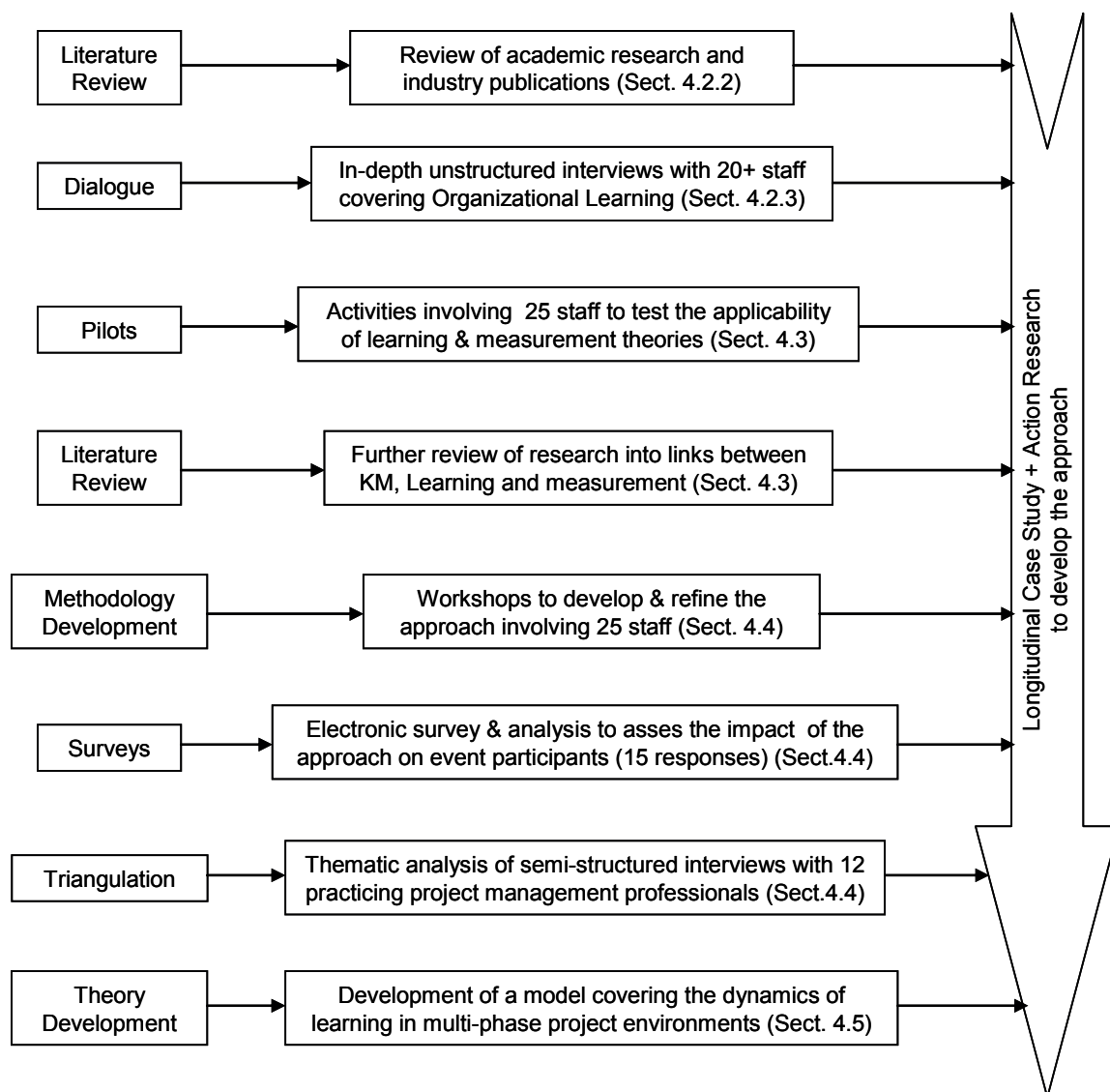


Figure 3: Overall research methodology

3.4.8 SUMMARY AND RESEARCH PLAN

The overall methodological approach selected for this research takes the form of an action research based longitudinal case study which is being used to improve learning in project-based organizational context. It depends generally on qualitative methods i.e. direct observation, participation, targeted individual interviews and direct intervention in the form of delivering workshops. There is also limited quantitative evidence from surveys of participants in the workshops.

The research was conducted in a series of four phases. The detailed research methods used for each phase are explained in earlier parts of this section, section 4 and in the relevant papers in Appendices 1-4.

The first phase covered the initial review of the literature and related work in the field, both academic and in the context of project-based organizations. It provided the opportunity to map out the detailed research activity to deliver the objectives of the study. The second phase consisted of initial pilots to investigate learning and measurement concepts and tools in real-world settings. The third phase covered the development of the new event-based project learning processes designed to improve the capture, dissemination, implementation of lessons from projects by promoting measurement of benefits. In the final phase a project learning model was developed that can be used to better understand and explain how the complex theories and abstract concepts operate in a project-based learning environment.

The approach to the research is summarized in the research map shown in Table 4 below. This shows how the aims, objectives and associated research questions were dealt with in terms of phasing, work tasks, methods employed and the outputs in the form of papers.

Table 4: Research map showing; objectives, questions, phasing, tasks, methods and outputs

Phases	Overall aim: To improve project learning processes through the identification and subsequent application of relevant organizational learning and knowledge management theories.				
	Research Objectives	Research questions	Work Tasks	Research Methods	Research Outputs
Phase One	To review existing research on learning in project-based organizations in order to identify potential models for informing learning practice within the support services environment.	What are the key learning and knowledge management theories that apply to project-based organizations?	1. Review of academic work in the field both academic and in the context of project-based organizations.	Literature review	Paper 1 + CIB W102 conf paper
	To critically evaluate existing project learning processes within Mouchel.	How is organizational learning and knowledge management currently applied in practice?	2. Survey existing organizational learning activities in the case study organization to establish where and how the research can contribute to improve learning practice	Archival analysis Dialogue Case study	
Phase Two	To develop a practicable time-efficient approach to capturing lessons learned and benefits measurement.	What theories and approaches can be used to propagate duetero-learning in project environments?	3. Further review of the literatures covering links between KM and Learning including common barriers, IC measurement methods, competency-based measurement approaches.	Literature review	Paper 2 + ARCOM conf paper
		How can an event-based approach with a benefits focus be used to overcome barriers to project-based learning?	4. Learning & measurement pilots to explore appropriate theories and various tools/techniques emerging from the review.	Action research Pilots Surveys Case study	
Phase Three	To develop and validate approaches for propagating project learning across the wider business.	How can <i>praxis</i> aid the development of improved lessons learnt processes in projects across organizations?	5. Project learning process development based on <i>praxis</i> to overcome the barriers to learning across organizations.	Action research Pilots Surveys Case study	Paper 3 Paper 4 + IRF article
Phase Four	To generalise a new theoretical framework for the application of learning theory in project-based environments	How can existing theory be communicated in a more understandable manner?	6. Development of a model, based on existing concepts and reflection on the research outcomes, which can be used as a lens for examining generative learning in projects.	Action research Theory development	Eng D Thesis + Future paper

4 RESEARCH UNDERTAKEN

4.1 INTRODUCTION

This section provides a detailed description of the research undertaken to meet the aims and objectives. The research was carried out in four phases. The first phase was a review existing work carried out in the general domain of organizational learning in knowledge intensive organizations which typically operate in a project-based environment. The second phase built on the review via a series of initial pilots which explored appropriate theories and various event-based tools/techniques emerging from the review. The third phase focussed on project learning and covered the development of an event-based approach to overcome the barriers to learning in multi-phase project environments. The final phase covered the development of a model, based on existing concepts and reflection on the research outcomes, which can be used to aid understanding of the complex concepts and as a lens for examining generative learning in projects. The findings resulting from the activities outlined in this section are summarised in section 5 of the thesis. Further details on the research undertaken can be found in Papers 1 – 4 included in the Appendices 1 – 4 respectively.

4.2 PHASE 1- REVIEW OF EXISITING WORK

4.2.1 OVERVIEW

There were two main objectives for this Phase. The first was to review existing research to identify potential models that could be used to inform learning practice in the context of project-based organizations involved in support services. The second was to investigate existing learning processes in the case study organization.

The review of existing work covered both the academic and industry practice-based aspects through archival analysis (Yin, 2003) and dialogue with researcher and practitioners. The key objective was to provide the RE with enough knowledge and information to carry out the initial scoping of the study, determining an initial personal viewpoint for the research and then planning how it would be executed (Blaxter et al, 2006; Hart, 2001; Yin, 2003). The aim of this phase was to address the following research questions:

- What are the key learning and knowledge management theories that apply to project-based organizations?
- How is organizational learning and knowledge management currently applied in practice and what barriers exist?

The literature review was also used to develop the research questions used in the phases of the research that followed.

During this period personal development activities were undertaken to improve the RE's research and management skills through taught modules. Topics covered included; Research, Innovation and Communication; Management and Professional Development; Teamwork and Leadership; Construction Innovation and Site Strategy; Human Resource Management in

Construction Projects. This section summarises the research carried out in this phase and further details can be found in Paper 1 in Appendix 1.

4.2.2 LITERATURE REVIEW

An initial review of the literature identified several themes or bodies of literature that were relevant to the proposed research. The key concepts that were found to relate to this study are; Organizational Learning (OL), Learning Organizations (LO), Knowledge Management (KM), Intellectual Capital (IC). In addition, context based studies were sought and reviewed covering project-based learning and relevant implementation case studies (i.e. in knowledge intensive and/or construction/support services organizations). During the course of the review the following main proponents of the most relevant areas emerged; organizational learning (Argyris and Schön, 1978), learning organizations (Senge, 1990), organizational knowledge creation (Nonaka and Takeuchi, 1995), measurement of learning (Jashapara, 2003), barriers to learning (Argyris, 1992) and, boundary objects (Star and Griesemer, 1989). Further details on these topics are summarized in Section 2 of this thesis and further detail can be found in the literature review sections of supporting papers in the Appendices which are referenced where relevant. The review of the literature was an ongoing process and following the initial literature review was revisited as part of the preparation for each remaining phase of the research

4.2.3 REVIEW OF EXISTING INITIATIVES

During this first phase existing learning related initiatives in the case study organization were also surveyed and mapped in order to understand how the company was dealing with organizational learning in general (see Table 5) and in the RE's sponsoring business stream (see Table 6) The aim of this work was to ensure that the EngD research complemented and contributed towards the success of any existing work.

Table 5: Initiatives sponsored at Group level

Initiative	Key Objective	Key outcome(s)
PM@MP project management guide	Provide consistency across projects	Improved project outcomes Good practice development Cross-boundary learning
Learning guide	Communicate policy & process	Improved understanding of learning Greater participation in projects
Learning network inc. learning partners	Provide leadership for learning	Active encouragement of learning by individuals
Learning support	Assist individual's academic learning	Improved research outcomes Better use of research project results
Company Induction	Alignment of new starters to corporate goals/values	Common understanding of company objectives and values Early networking
Staff Performance Management via appraisal process	Create high performance culture	Improved efficiency and more valued workforce Identification of learning objectives
Graduate Development programme	Encourage high potential recruits	Increase in number of graduates recruited and retained
Managing the 'Company' Way – 17 workshops	Improve full range of competencies of managers	Ongoing development of competencies
Management development programme	Provide structured development path for managers	Larger and improved pool of managers
Front line Managers programme	Structured development for first line management	Support for front line managers in developing into their new role
'Taking the lead' workshops	Align managers to company leadership values	Better understanding of management behaviours and issues
Managers Induction Guide	Alignment of new managers	New managers more effective earlier
Business Leaders programme	Structures programme for top level managers	Specialised development for future leaders
KM forum	Encourage dialogue on KM	Promotion of KM Integration of views across the company Strategy roadmap development
Communities of practice	Encourage effective knowledge sharing	More effective use of specialist knowledge Voice to the profession

Table 6: Initiatives sponsored at Business Stream level

Initiative	Key objective	Key outcome(s)
Engineer Doctorate programme	Improve the business stream through learning organisation techniques	Better understanding, transfer and implementation of learning concepts
Management development programme	Promote action learning for high potential managers	Immersion and cross-fertilisation Business improvement and managers development without changing jobs Promotion of innovation
Innovation process	Develop sustainable innovation	Development of an innovation culture Improved number of innovations implemented
Learning from compliance	Implement triple loop learning	Change in the culture of auditing and reporting
Consulting engagement process	Capture of learning points throughout projects	Increased client satisfaction and promotion of reflective learning
Business Maturity Model	Assessment of impact of learning and KM	Improved internal benchmarking of improvement
Knowledge Transfer Partnership programme	Develop and implement a KM strategy	Review of current understanding, attitudes, practices and needs Progressive engagement of business stream through targeted pilots
Academic forum	Industry led academic involvement	Open dialogue with academia Better targeting of research
Research panel	Control & Governance of research	Central point of contact for stimulating and scoping research

It was at this stage in the research programme that a decision was made to limit the scope of the study to the sponsoring business stream. This aligned the study more closely to the RE's day-to-day activities as an internal consultant dedicated to that business stream. The overall aim was to maximise the effectiveness and quality of the research outputs. The list of activities in Table 6 was used to identify suitable vehicles to use as pilots to test out various theories, tools and techniques emerging from the study. Those selected were the management development programme, learning from compliance and the consulting engagement process. In the case study organization the existing approach to developing Learning had Board level sponsorship. It was mainly focussed on developing the competences of individuals in order to create a 'high performance' culture. The people involved in the current learning activities were highly motivated individuals committed to improving learning. However, their natural

enthusiasm needed to be used in a more strategic way to overcome the barriers e.g. pressures on time, shortage of resources, lack of understanding. Some of these barriers arose from the imperative for rapid growth created by an ambitious corporate strategy. However, managers found it difficult to appreciate learning as a key aspect of their own and the company's operational effectiveness. This meant that organisational learning needs were being addressed by proxy rather than defined as part of an explicit corporate strategy to develop a learning organization culture. The overall effect was the creation of pockets of 'culture change' rather than holistic change. A key issue is the role of management versus leadership and a major challenge is how to deliver an abstract concept into practice.

4.3 PHASE 2- INITIAL PILOTS

4.3.1 OVERVIEW

The main objective of this phase was to develop a practicable time-efficient approach to capturing lessons learnt and benefits measurement. Various concepts and tools/techniques were investigated. These were identified from the first phase of the research which examined existing work in the field. In addition, a further review of the literatures was carried out covering links between knowledge management and learning, intellectual capital measurement methods and competency-based measurement approaches. The aim of this phase was to address the following research questions:

- What theories and approaches can be used to propagate duetero-learning?
- How can an event-based approach with a benefits focus assist in overcoming barriers to project-based learning?

A series of pilots were used to apply the most relevant theories in real world environments. They were designed to allow the issues and barriers to the implementation of learning theories to be examined and remedies proposed. This part of the study also started to investigate ways to simplify the explanation of learning theory to the stakeholders involved in order to increase their 'buy-in'

This section summarises the research carried out in this phase and further details can be found in Paper 2 in Appendix 2.

4.3.2 CONSULTANCY ENGAGEMENT PROCESS LEARNING

The first pilot was based on a Consultancy Engagement Process (or Framework) learning approach which had been developed to improve the demonstration of value added using through-project-lifecycle learning measurement. It was designed to gain commitment to improvement projects and review their progress. The process consisted of three planned occasions where benefits data was captured during the lifecycle of a project. The first was during project set-up where potential areas of benefit were identified. In the second, during project delivery, key learning points and benefits were captured at pre-determined review meetings. At the third, on project closure, a summary of benefits, both quantitative and qualitative, and key lessons learnt were documented and transferred to a simple database. In addition, a value curve is produced as an exemplar of measuring client perception of delivery quality and reflection of the team members own performance through the project lifecycle. The benefits are captured in the project file document which becomes the vehicle for capturing the learning and associated benefits on an empirical basis. This information can

then be extracted into a database of benefits both quantitative and qualitative. Aggregation of any financial benefits can be carried out on an ongoing basis and a report generated annually.

4.3.3 ASSURANCE-BASED LEARNING CYCLE

The second pilot involved the Assurance based learning (or Team) learning cycle. In this case the approach was used to demonstrate how the complex concepts can be made more acceptable by adapting a well known improvement model to gain acceptance of new techniques with the actors. It used the Assurance team as an exemplar in the creation of a learning cycle approach to measurement of learning through an event based approach. It utilized the traditional assurance based audit process linked to an adaptation of the Plan-Do-Check-Act cycle spread across an annual quarterly cycle of events designed to propagate double loop learning (Argyris and Schön, 1978 p3), duetero learning (Argyris and Schön, 1978 p27) and best practice/benefits capture.

A series of reviews of audit findings and trends were held on a quarterly basis. The content of each of the events was changed to mirror the Plan-Do-Improve-Learn cycle which in turn was linked to the business planning cycle. Through the cycle an increasing number of actors from a wider pool of departments were progressively involved to share and generate the knowledge and learning gained. In this case dissemination was through the use of a simple database and retrieval system using a 'yellow pages' based approach to provide a directory of benefits i.e. cost savings, lessons learnt, best practice.

4.3.4 MANAGEMENT DEVELOPMENT PROGRAMME LEARNING

The third pilot involved an existing management development programme (Transaction) which was used to further develop project learning cycle concepts i.e. propagation of double loop and triple loop (or duetero) learning. The programme was aimed at 'high potential' managers and was designed to give them development opportunities elsewhere in the business stream via part-time secondments (or Transactions) over one year whilst remaining in post. The whole process is supported through a series of four facilitated events. The first introduces the programme and outline project plans are prepared. The second event is a review of the projects' progress and introduces new management tools/concepts that may be useful. The third event is a learning event forming the end of a triple loop learning cycle. The final event is a presentation by a selection of the transactors and hosts to the Business stream board with case studies on the projects and a recommendation for changes and continuation of the programme. A number of the past transactors are then involved in running the programme for the next year.

4.3.5 RESULTS OF THE INITIAL PILOTS

The results of the pilots showed that a number of barriers to learning were overcome through the pilots and these are summarised in Table 7 below. The list of barriers was based on those identified in the earlier Phases.

Table 7: Barriers to learning addressed

Barriers Addressed	Consultancy Engagement Process	Assurance Team Learning	Management Development Programme learning
Management buy-in,	x		
Lack of business case	x		
Learning	x		
Employee resistance	x	x	
Being seen as separate from daily activity	x	x	x
Understanding complex concepts		x	x
Bottom line focus		x	x
Challenging the status quo			x

The pilots enabled the merits of the different approaches to be identified and built upon in the next stage of the development of the new approach.

In the course of running the pilots in phase two the findings from the ongoing review of the relevant literatures resulted in the RE focussing his approach to implementing learning organisation principles on the links between learning and knowledge management. It has also revealed a need to find ways of operationalising the theories to bring them into practice i.e. through the identification/quantification of benefits and the use of terminology that the workforce at all levels can understand. Also at this stage the possibility of examining further a competency based approach to measurement was considered but due to changes in the RE’s role it was not feasible to pursue this line of inquiry.

4.4 PHASE 3- DEVELOPMENT OF THE NEW APPROACH TO PROJECT LEARNING

4.4.1 OVERVIEW

The main objective of this phase was to further develop and validate the approaches developed in Phase 2 in order to propagate duetero-learning across the organization. Four further events were used to refine the new approach to event-based learning in projects to improve *praxis*. The research question addressed in this phase was:

- How can *praxis* aid the development of improved lessons learnt processes in projects?

This phase used an IT–based business wide system implementation project and part of the management development programme as the vehicles for the research in this phase. Three ERP project learning events and one management development workshop were used to test out and develop the new approach. The main aim of these events was to trial the application

of the concepts identified during the research that would assist in overcoming barriers. The key objectives were to provide a means of capturing lessons learnt in a structured manner, improve their implementation and promotion of benefits measurement.

The ongoing review of the literatures in this phase resulted in further key concepts being mobilised to understand the processes involved and overcome some of the barriers identified in the previous research phases covering boundary objects (Wenger 2000), Knowledge spiral (Nonaka and Takeuchi, 1995), concept of 'ba' (Nonaka et al 2000), 'open-space' facilitation (Owen, 2008) and the need for improved *praxis*.

This section summarises the research carried out in this phase and further details can be found in Papers 3 and 4 in Appendices 3 and 4 respectively.

4.4.2 EVENT BASED LEARNING WORKSHOPS

The new approach to project learning was developed through events made up of a number of specific elements designed to take the participants through elements of a learning cycle during the workshop. The event was designed to overcome barriers to learning by providing time and space for personal reflection, the opportunity for the sharing of ideas and experiences with others and facilitates the capture of the resultant learning. The actors involved in the events included project team members from different disciplines, different parts of the organization and external partners.

The project learning cycle, which the new approach creates, has been developed into a model consisting of seven main elements (see Figure 4). Five of the elements are covered in the event itself and consist of; identification of lessons, selection of the best ideas, prioritisation and finally, benefits card preparation. The other two elements are personal reflection which is carried out as pre-work and implementation of the lessons which occurs after the event.

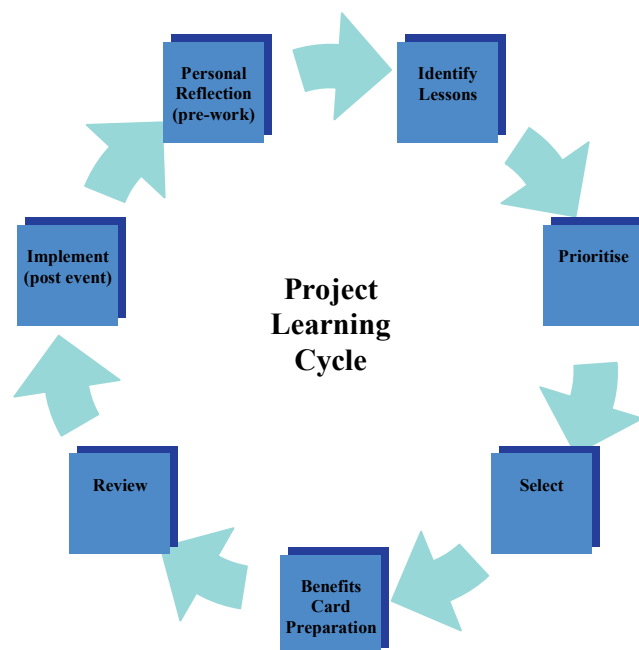


Figure 4: Project learning cycle

A breakdown of the way in which the first ERP workshop progressed in order to produce the benefits realisation cards is included in Table 8. It shows the learning cycle element, the processes used to generate the learning conditions/outputs and the outcomes for each process step.

Table 8: Breakdown of the first ERP workshop

Event session and project learning cycle element covered	Process	Outcomes
Pre-work – aimed at: - self-reflection	Request for participants to give their view of top three successes and top three shortcomings. Proforma sent via email.	Completed by three participants.
Looking back – aimed at: - identifying lessons	In groups review of pre-work & brainstorming ideas for improvement using post-its and “open space” reviews followed by a consolidation exercise	Individual reflection and group learning. Initial list of top twenty lesson opportunities
- prioritisation	Individual voting exercise based on impact vs. ease of implementation	Individual and group learning. Consensus on top ten lesson opportunities.
- selection of lessons	Whole team review to assess priority based on size of benefit, costs, ease of implementation and lead time	Individual and group learning. Prioritisation of top ten lessons for the next stage
Looking forward – aimed at: - completion of benefits realisation cards	Preparation of benefits realisation cards in groups with event recorders to produce cards which are projected onto a wall as they are produced.	Completed benefits realization cards
- reviews	Printed and displayed as they are completed to allow regular “open space” reviews of the outputs	Individual and group learning. Better quality outputs.

The events were time-limited to overcome the time pressures on non-core project activity and were designed to last a maximum of four hours. They had a basic agenda that could be adapted to meet the aims and objectives for a particular event. The outputs generated from each of the events in terms of benefits cards are described below. The first IT project based event covered lessons learnt capture and measurement for the first completed phase of the project and was attended by nine delegates. Pre-work was set which requested attendees to identify three examples of what had gone well in the first phase of the roll-out and three examples of what had not gone so well. A total of four benefits cards were produced covering programme roles and responsibilities; leadership; common processes; and, project management. An example of an output from the first event is shown in Table 9 below.

Table 9: Benefits card content example

Classification Element	Sample content
Functional/Operational Area impacted	Programme Roles & responsibilities
Benefits Focus	System implementation
Current state	<p>Changing resources</p> <p>Lack of time to ensure new people are up to speed</p> <p>People taking on additional activities/tasks making them 'stretched' from working extra hours/weekends which impacts on peoples lives, attitudes, task delivery etc</p> <p>Lack of clarity on roles, responsibilities & links to the business</p> <p>Extra time spent on tasks already in progress</p> <p>Lack of planning, communications etc</p> <p>Lack of resources</p>
Future state	<p>Clearer roles and responsibilities</p> <p>Highlight tasks/activities that fall down the gaps & plan to mitigate these</p> <p>Ensure new roles are clearly identified and communicated</p> <p>Identify succession for business peoples roles</p> <p>Effective Induction process</p> <p>Pictures of people on team and their roles</p> <p>Technical and change teams working together on change management</p> <p>Improve effectiveness of team via workshops, run through sessions etc</p> <p>Ensure team members are given necessary skills and tools to be out in the business</p>
Benefits measurement approach/target range	<p>Number of sessions repeated</p> <p>% of roles defined and communicated</p> <p>% budget spend over/under vs. target</p>
Benefits Realisation:	
Critical Dependencies/Barriers	<p>Clarity of key roles and responsibilities</p> <p>Lack of time and resource to develop job cards</p> <p>Teams flexibility to adapt to new roles</p> <p>Reporting structure to be clear</p> <p>Ensure people have clearly defined roles and are not carrying out their day jobs</p>
Risks/Issues & Mitigating Actions	<p>People not accepting non-Business manager</p> <p>People feeling uncomfortable about new roles and impacts, possible chance of people leaving</p> <p>Ensure we have enough resources to fill all required roles</p>
Resources /Actions Reviews Timescale Owner	<p>PMO to define all key programme roles/responsibilities and communicate to programme</p> <p>Communicate org structures and roles to Steering group</p> <p>Prepare people + picture board</p> <p>Outline induction process</p> <p>Identify post Connect succession plans for project staff</p> <p>Set up monitoring and produce monthly report on progress for key/critical items only</p>
Key Contacts for further information :	<p>Name, area of expertise, contact details, c.v. link.</p> <p>Note: This information has been deliberately omitted for confidentiality reasons.</p>

The second event concentrated on benefits identification and measurement for the project and was attended by eight delegates. The focus was on examining the potential impact of benefits arising from the implementation of the new IT systems and devising suitable methods of quantifying them. For pre-work the participants were requested to identify five areas of potential benefit. The benefits realization cards from the first event were also circulated at the start. Again, four benefits cards were produced against an original target of six. This occurred due to fewer numbers attending than planned due to project time pressures. The benefits realization cards produced covered procurement, integrated operations, resource planning and billing.

The third event focussed on business benefits from the project that could arise in a specific business division and was attended by seven delegates. Twenty invitations were sent out to a cross section of team members from which there were eleven acceptances. The pre-work requested participants to identify five possible areas of benefit in their business division. The target of producing six benefits cards was achieved in this instance. The six cards produced covered procurement strategy, operational purchasing, process control, resource planning and financial processes.

The event held with the group of Line Managers engaged on business improvement projects generated six Benefits Realisation Cards covering their own particular projects.

The key barriers that the new approach was designed to overcome were identified through direct observation, reflective practice and archival analysis by the researcher during the course of the case study. The challenges, the process by which they were overcome, and the relationships to the theories/concepts mobilized are detailed in section 5.

Once each workshop was completed the participants who attended the events were sent an electronic survey. This survey was designed as part of the research methodology to provide a richer feedback, rather than just the researcher's observations, and to allow participants time to reflect on the event.

The survey posed a total of ten questions to participants of the event based learning workshops (see Table 10 below). The first question was designed to capture the detailed background on the respondent (although the analysed data would be anonymous). The following nine questions were aimed at gaining an understanding of the individuals' views on learning, their experience of how project lessons learnt and benefits was dealt with currently and what was the impact of the workshop. The response types for the questions posed ranged from multiple choice lickert-based layouts to free text options. The questions were reviewed by other researchers with experience in developing questionnaires on related topics and refined according to the feedback received.

Table 10: Electronic survey questions

No	Primary Question	Secondary Questions
1	Please provide the following background information?	Name, Business stream, Business unit, Division, Main working location, Email address, Phone number.
2	How important is learning currently?	Two way matrix: Axis one: to you, your team, your business, the company Axis two: not important, sometimes important, important, very important
3	Do you learn from projects that you and your team are involved in?	If yes, how?, If no, why not?
4	When do you look at benefits measurement in projects?	Prior to the start, During the project, At the end of the project
5	When do you capture/use lessons learnt?	Prior to the start (from previous projects), During the project, At the end of the project
6	How do capture/ measure/ monitor benefits and lessons learnt?	KPI's, Reports, Reviews, Workshops, Database, Other
7	How do you communicate benefits & lessons learnt? Please give brief details for each one selected.	Reports, Newsletter, Intranet, Email, Notice board, Other
8	What are the key learning points you have gained from this workshop?	Free text answers
9	What will you do differently as a result of this workshop?	Immediately, After 3 months, After 6 months, After 1 year?
10	How will you share the experience(s) you have gained from this workshop?	Free text answers

The response rate for the electronic survey sent to all thirty attendees of the events was relatively good with 15 responses received. Due to the small sample size the results shown are from the two free text questions in the survey which give a better picture of the actors' views. The first of the free text questions asked "What are the key learning points you have gained from this workshop?" and was designed to elicit what learning the attendees thought they had obtained. The second free text questions asked "What will you do differently as a result of the workshop?" and was aimed at exploring how the attendees would use the learning they had obtained in practice. The results from the survey are summarized below, for a more detailed account see Paper 4 (Appendix D)

In response to the first question fourteen of the fifteen respondents to this question gave at least one example with one not providing any example. In total there were forty-six useable examples of key learning points. A grouping analysis was carried out which revealed that there were fourteen examples with references relating to learning from others or networking equating to a third of all responses. The results of the analysis are shown in table 11.

**Table 11: Grouping analysis of responses to first free text question:
“What are the key learning points you have gained from this workshop?”**

Grouping 1: Learning from others or networking related	Grouping 2: Benefits or outcomes related
“Knowledge of new IT system” “Individuals business knowledge of the company” “Team work” “Knowledge” “Wider Group goals and strategy” “Value of networking” “Learning from other people on the project and understanding their opinions” “Understanding that someone else's priorities won't be mine” “Achievements from the wider business” “Working strategically across Business Units” “Improved my listening skills and questioning techniques (80:20 rule)” “How different people view priorities” “Working with the wider business” “Networking”	“Proof that all projects can show indicative quantifiable benefits” “Benefit of talking to CEO” “How better to quantify benefits” “Recording benefits” “Look at the outcomes and not always the outputs” “Cost benefits to the whole company” “Technique to get people thinking about benefits and how they can be measured” “Benefit of networking” “How to focus on outcomes” “Key business cost savings” “Broader understanding of opportunities” “Analysis on improving future project tasks and activities” “It's important to track benefits throughout the project life cycle” “Benefits of brainstorming” “One technique for attempting to estimate benefits”

The level of responses related to learning indicates that the workshop had made a reasonable number of the actors think about using their own learning as well as that of others in a wider context across the business. This indicated that the workshop process contributed towards achieving the aim of promoting a “learning to learn” culture.

The grouping analysis also revealed that there were fifteen examples with references relating to benefits or outcomes which equated to a third of all responses. This level of response indicates that a reasonable number of the participants recognised the need to consider benefits in the context of project learning as a result of the workshop. This showed that the second aim of the new approach, to promote benefits measurement, was being achieved to some extent.

In response to the second free text question “What will you do differently as a result of the workshop? Immediately; After 3 months; After 6 months; After 1 year” twelve of the fifteen respondents to this question gave at least one example whilst three did not provide any example. This resulted in twenty-nine examples of what the actors would do differently over the time periods indicated.

The grouping analysis revealed that there were two broad themes “learning from others or networking” and “benefits or outcomes”. This echoed more strongly the themes found in the groupings found in the first free text responses in that there was no residual “Other” theme.

A total of sixteen responses were related to “learning from others or networking”. The majority of the responses, 12 in all, covered the immediate (7) and after 3 months (5) timeframes. Examples of these responses were:

Immediately: “Ensure lessons learnt are captured through the Weekly Project report sheets”

After 3 months: “Set up an Improvement Action Plan from Client Feedback Scores

Examples of the longer timeframe responses were:

After 6 months: “Capture Lesson Learnt/ Best Practice and keep a Central file”

After 1 year: “Review progress of for the development programme projects”

The grouping analysis revealed that there were sixteen responses related to “benefits or outcomes”. The majority of the responses, 13 in all, were in the immediate (5) and after 1 year (4) timeframes. Examples of these responses were:

Immediately: “Promote thinking around benefits realisation”

After 1 year: “Remember it is possible to quantify benefits for all projects, which will enable their promotion.”

Examples of the medium timeframe responses were:

After 3 months: “Develop techniques for quantifying benefits”

After 6 months: “Did we get the benefits we committed to?”

This level of response demonstrated that the actors had an even greater intent to apply the learning in practice both in terms of encouraging wider learning and more focus on benefits quantification and realisation. With the latter it appeared that they recognised the need to deal with these over a longer horizon and that the learning impacts would be over the shorter term. Although all these observations were a result of qualitative analysis they showed that the two key aims of the new approach in propagating a “learning to learn” culture and promoting benefits measurement had been to some extent achieved or at least recognised by the project team members attending the events.

4.4.3 TRIANGULATION

In order to provide validity to the results a series of semi-structured interviews were carried out with experienced practitioners to compare the results with their views on lessons learnt and benefits realisation on projects. Towards the end of phase three of the programme a series of 12 semi-structured interviews was undertaken from a target list of 46. The participants targeted were practicing management professionals with combined lifetime project management experience across a range of industries including the public sector, support services, architects, consultants, oil, training, IT, construction, transport, environmental, manufacturing and the public sector. The number of years spent in ‘hands-on’ project management roles spanned from five years to thirty years.

The interview was broken down into 15 elements (see Table 12). The first was an introduction to give a brief outline of the research, explain the interview process, the confidential nature of the discussion, anonymity of the outputs and generally put the interviewee at ease. The second question was designed to collect the interviewees’ background and in particular in a project management context. Questions 3 to 10 were the key elements of the interview and aimed at gaining the interviewees views and experience of lessons learnt activities in projects. The

questions were open ended with each element completed by asking the interviewee of any examples that would illuminate their responses. The final elements 11 to 15 gave the interviewee the opportunity to make any additional points not mentioned earlier, ask any general questions, talk through the follow-up options and a request was made to check if there might be any other suitable interviewees that they knew. Finally, the researcher thanked the interviewee for their time and the opportunity to gain valuable research data.

Table 12: Phase 3 semi-structured interview questions

No	Question
1	Background information Interviewer – name, research role. background Introduction to the interview – background, purpose, confidentiality, feedback
2	What is your background in general and specifically in projects? What is your general working background? What is your Projects experience and where? What methodologies do you know and/or have used? Are lessons learnt included? What are your views on methodologies?
3	What are your views and experiences of lessons learnt good practice?
4	What are your views and experiences of lessons learnt poor practice?
5	What are your views and experiences of lessons learnt methods of capture?
6	What are your views and experiences of lessons learnt dissemination?
7	What are your views and experiences of lessons learnt implementation?
8	What are your views and experiences of lessons learnt benefits identification?
9	What are your views and experiences of lessons learnt measurement?
10	What are your views and experiences of lessons learnt wider outcomes?
11	Any other points you wish to raise?
12	Any other questions?
13	How would you like the interview to be followed up? Telephone; Meeting; Workshop; Copy of research outputs?
14	Can you recommend any other potential interviewees?
15	Final closing remarks: Thanks for their time and participation

The results of the analysis are summarised below. A more detailed account of the template analysis method used for this activity is provided in Section 3.4.4. The interviews were recorded and subsequently transcribed. A template analysis (King, 1998) was carried to identify themes in the responses. From this analysis a comparison was made to see how the event-based approach dealt with the themes/issues raised in the interviews are summarised in Table 13 (below).

Table 13: Development of themes and approaches to deal with issues

General Theme Heading	Issues raised	How the new approach deals with the issue
Methodology	PRINCE2 most commonly identified with lessons learnt included	Provides a process for lessons learnt and benefits that fits with PRINCE2 methodology
Good practice	Use of group learning	Use of event-based workshop
Poor practice	Poor dissemination Resources made available not accessed Lack of time Not recorded	Use of benefits cards Emphasis on benefits Time constrained event Use of benefits cards
Methods of capture	Written documents Face-to-face IT tools	Use of benefits cards Use of event-based workshop To be addressed
Dissemination	Written documents Group activities IT based Remote conferencing	Use of benefits cards Benefits emphasis improves buy-in To be addressed Future development
Implementation	No themes identified	n/a
Benefits identification	No themes identified	n/a
Measurement	Cost savings Non-tangible Not done Time savings	Use of benefits cards Use of benefits cards Benefits led approach improves buy-in Use of benefits cards
Wider outcomes	No themes identified	n/a

The results of the analysis showed that the most quoted methodology was PRINCE2 the UK methodology developed and promoted by OGC. However, in all cases they stated that an in-house methodology was used. Several of these were based on PRINCE2 and one was moving to a full PRINCE2 based methodology but none were full PRINCE2. An example of a response was:

"As an organisation we have trained in PRINCE2, but we don't entirely use PRINCE2, we base the whole system around using project management programmes such as a disaster team plan and basing the whole structure and critical paths and analysis and undertaking work within set time for the projects"

All methodologies were reported as including lessons learnt and most interviewees indicated that methodologies were useful if only as a guide. An example of a response was:

"In many cases... a good thing to have Provide foundations by which we should work from...tendency...sometimes to become too prescriptive and therefore organisations will..... adapt their own versions...."

There were also a number of negative comments on methodologies. An example of a response was:

"They don't use it properly and it is done because it has to be done; Show me this, show me lessons learnt, ok, tick, tick."

However, the results from the remaining questions (2 to 10) which asked for more detail surrounding lessons learnt and benefits measurement showed that the manner that this topic was addressed can be inconsistent which was probably due to individual methodologies being used. As a result identifying themes from the transcripts for questions 2 to 10 was difficult and no themes could be identified for three questions covering lessons learnt implementation, benefits identification and wider outcomes. This could indicate the lack of process or detail in methodologies in this area. Interestingly, on the question specifically asking about lesson learnt good practice the only theme to emerge was the use of group learning which was mentioned by most interviewees. Again this could indicate lack of consistency of approach to the topic. One of the responses to this question stated:

"I think the challenge is capturing the meaningful information and I think a lot of people have some sort of story in their head and don't realize what they are doing, it's almost like they have learnt it and they won't let it happen in one of their projects and the challenge is teasing it out."

Between three and five themes were identified for the remaining four questions covering poor practice, methods of capture, dissemination and measurement. For methods of capture written documents was the most dominant with face-to-face and IT tools secondary. With dissemination written documents and group activities emerged as the most common answer with IT-based and remote conference as secondary methods. These appear to indicate that it is the traditional methods that are still the most dominant and the use of technology still some way to go to gain acceptance. This could be due to the social nature of learning and this was reflected in the following response which although using technology emphasised the need for social interaction:

"Publish lessons in a place that is easily accessible with short summary, key details and contact info. Use a matrix reference linked to technology and a network of dedicated highly visible experts."

On the subject of measurement three main themes emerged: cost savings, their intangible nature and that it is not done. This revealed that although measurement is possible where cost savings can be easily identified due to the fact that benefits are often intangible this makes measurement difficult and, therefore, it is in many instances not attempted. Two responses which illustrate the difficulties surrounding measurement were:

"Within the organization we don't have the bandwidth or the time or professional maturity in our delivery whether being projects or operations to go back and monitor, measure where we go it wrong and try to place a value on that."

"...how do you prove you have learnt from it...it's a bit of a non-tangible entity..."

The question on poor practice generated two main themes; poor dissemination and resources made available not being accessed which are closely related to one another. The two

secondary themes covered lack of time and not recorded which again may be related. Two responses on the themes of dissemination and lack of time/not recorded were:

"I think even when lessons learnt are done, they are quite often made available but it does make me wonder how often people actually read them."

"Lessons learnt...not as high on [agenda] on delivery closure or even reviewed on a periodic basis during a large program because everyone is always focussed on [achieving] the job and when it gets to the end of it they have already moved on to the next delivery."

The interviews gave the researcher a much richer insight into the way practice has developed in the field of project lessons learnt and although the sample size was small some themes did emerge but these should only be used as pointers as they do not necessarily reflect the larger population of project managers views.

The final step in this phase was to map the results of the thematic analysis to the new approach and how it deals with the issues raised. This is summarized in Table 10 which shows how the issues were dealt with in terms of event processes, benefits focus and outputs in the form of benefits cards. To demonstrate how this element of the research fits into the overall research as a means of triangulation the links to the original research questions are also shown.

4.5 PHASE-4 DEVELOPMENT OF A PROJECT LEARNING MODEL

4.5.1 OVERVIEW

The main objective of this phase was to generalise a new theoretical framework for the application of learning theory in project-based environments. A model for improving understanding of project learning dynamics has been developed which is based on a number of key theories the fields of Organisational Learning and Knowledge Management. These concepts were briefly outlined in section 2 and in this section they will be introduced in more depth in order to show how they can be adapted and developed to represent a generative learning model. The aim of this phase was to address the following research question:

- How can existing theory be communicated in a more understandable manner?

It is intended that this element of the research will form the basis for future journal paper (s).

4.5.2 MODEL DEVELOPMENT

In order to draw together the research into clearer focus the researcher has reflected on his work and looked at how it can be operationalized in a more understandable manner. The aim is to make the theoretical concepts that are mobilised more readily understandable. In order to achieve this a model is proposed which attempts to show, in a simple manner, how the key theories and concepts the process draws upon are applied to create an overall project learning cycle. This will aid the understanding of others who might wish to adopt the approach or extend the research into other contexts.

Project-based organisations are reliant on the expertise of their engineers and their ability to cope with a high level of complexity. Their knowledge is built up over a number of years where they learn the lessons from each project and build up an individual tacit knowledge base. The existing approaches to capturing lessons are difficult to apply consistently from projects and make this knowledge more explicit to a wider audience. A key challenge is to make this approach to learning and benefits realisation part of the culture of the organisation. The research revealed that there are several theoretical models that can be used to better understand the complex and often abstract theories involved in project learning. The events can be considered to act as ‘lenses’ onto the processes of learning. A model was developed which combines the key theories and concepts the process draws upon in order to provide a more comprehensive understanding of how it works in practice. A number of stages were involved on the development process (see Figure 5 below). The first was the identification of learning concepts/models from the literature review. The next stage was to assess their applicability to project learning in multi-phase project environments based on the researcher’s experience and action research using the workshop activity. The models selected were then synthesized using a series of graphical representations that demonstrated their applicability to multi-phase project environments. The final stage was to produce an overall model which could act as a graphical representation of the learning processes involved i.e. a generative project learning model as shown in Figure 9.

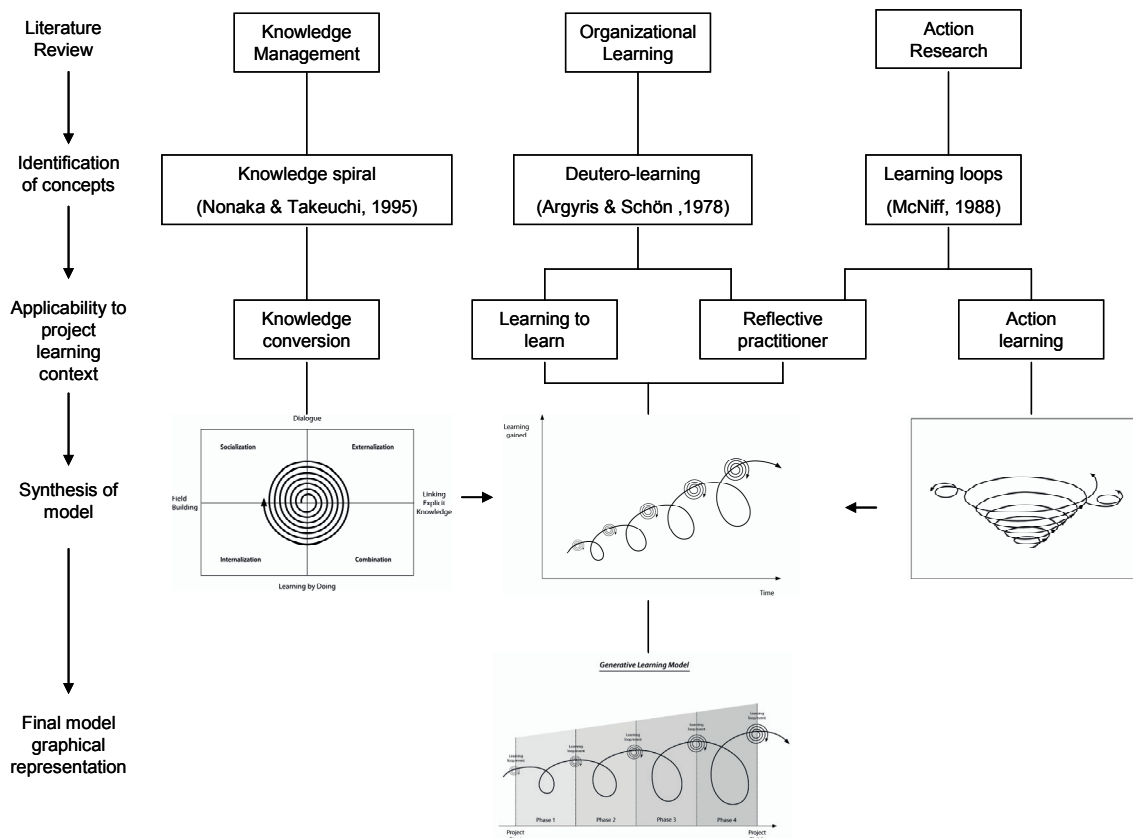


Figure 5: Stages of model development

The remainder of this section gives a more detailed explanation of how the model was evolved.

Identification of concepts (based on the literature review)

The approach is trying to create time and space for learning amongst the actors in an ongoing continuum. The aim is to create a number of ‘learning spirals loops’ (McNiff, (1988) over a period of time which are designed to help the actors to learn about learning (i.e. duetero-learning, Schön & Argyris (1978) through personal and collective reflection about their experiences on projects as well as in their general work. The list of concepts that are mobilised and the types of learning they are designed to instigate are outlined in Table 14.

Table 14: Learning concepts mobilised

Concept	Type of learning instigated
Duetero-learning (Argyris & Schön, 1978)	Reflective practice & learning to learn
Learning spirals (McNiff, 1988)	Reflective practice & action learning
Knowledge spiral (Nonaka & Takeuchi, 1995)	Knowledge conversion

Applicability to project learning in multi-phase projects

In order to explain these concepts more clearly there are graphical representations available covering learning and knowledge spirals but few if any covering duetero learning specifically (see Figs 4.1 & 4.2). These graphical representations do not fully take into account the temporal nature of learning as occurs in multi-phase projects. This could be down to the abstract nature of what they are attempting to represent i.e. learning and knowledge.

The pictorial representation developed by McNiff (1988: p45) and reproduced in Fig. 4.3 below is designed to show how problems outside the main problem being investigated can “...be explored as and when they arise without losing sight of the main focus of the enquiry”.

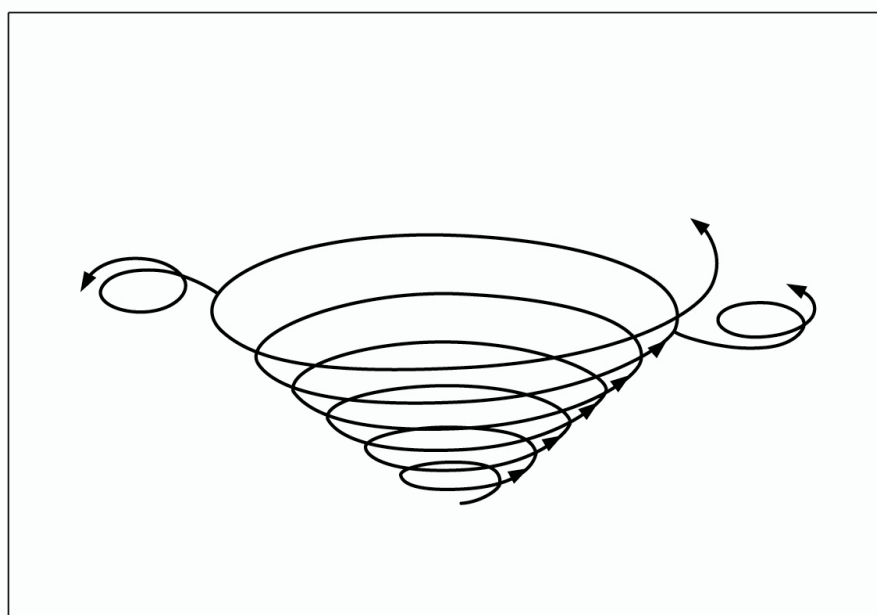


Figure 6: Three dimensional learning spirals or loops (c.f. McNiff, 1988 p.45)

The loops are based on an action-reflection-plan-observe cycle (McNiff, 1988) and the main spiral is designed to show the main area of enquiry and the smaller loops problems related to the main area of focus. The diagrams' three dimensional effect results in bringing some form of implied temporal or spatial element to the concept of learning cycles.

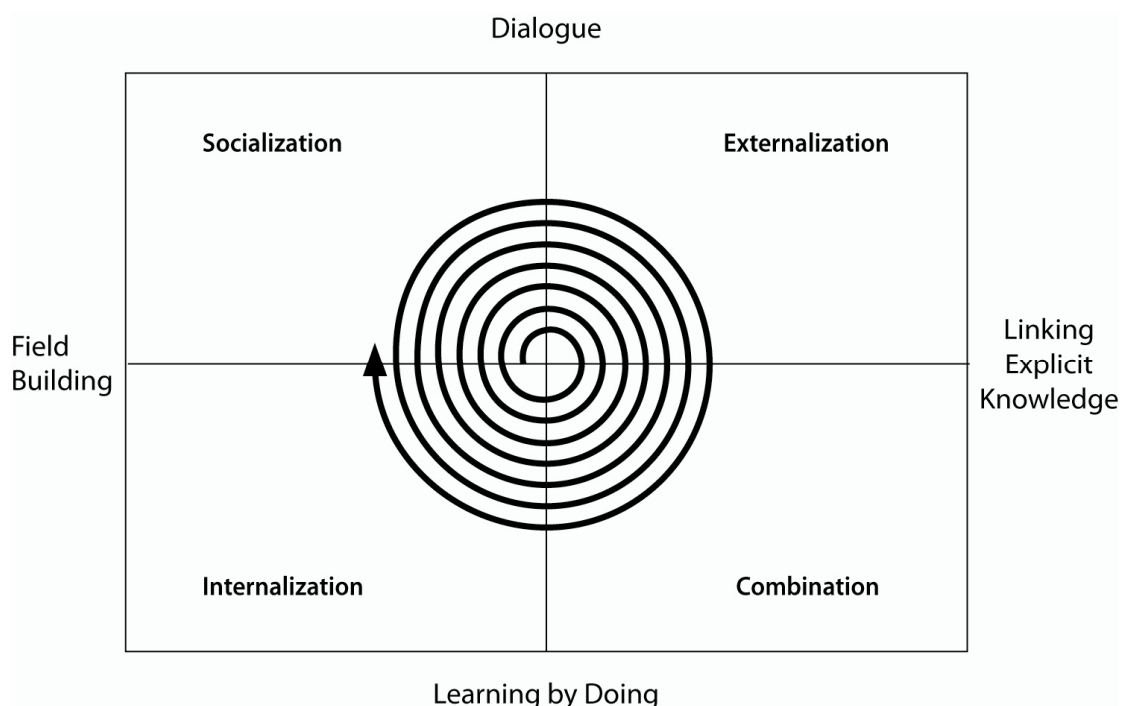


Figure 7: Knowledge conversion spiral (c.f. Nonaka & Takeuchi, 1995)

The Nonaka & Takeuchi (1995) SECI knowledge spiral model shown in Fig 4.4 above has some implied temporal meaning as the idea is that actors progress through the various knowledge ‘states’ which must involve some form of elapsed time. However, neither model attempts to show any timescale explicitly.

Synthesis of model

The approach developed through this research is designed to propagate learning and a learning to learn culture over time in multi-phase project environments. This is achieved through a number of specific events where the actors reflect on past experiences of both work and learning and then agree which are the most important lessons that should be implemented collectively and also they will carry away their own ideas of lessons that they could apply. As a result their learning will increase over time and this can be represented by the diagram in Fig 4.5 below which shows the ‘spirals’ of knowledge creation (Nonaka & Takeuchi, 1995) combined with the ‘learning loops or spirals’ (McNiff, 1998) which produce a series of learning cycles which generate the learning.

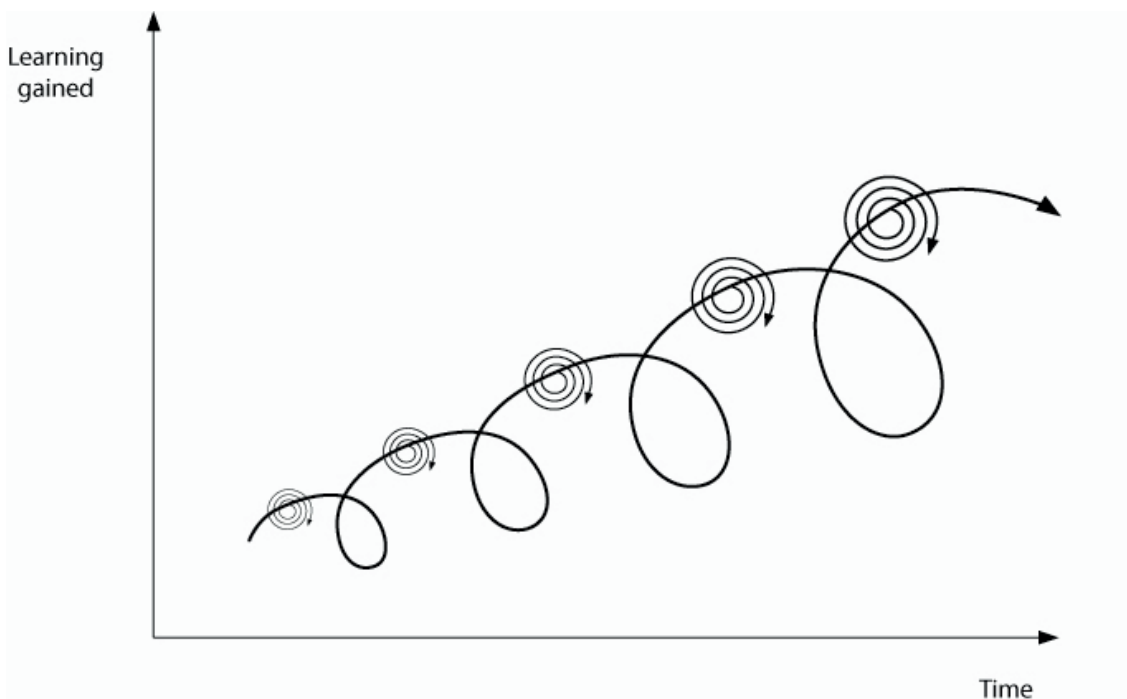


Figure 8: Generative learning cycle

Final model graphical representation

In order to show how this applies in a multi-phase project environment all that is needed is to superimpose a project plan onto the diagram to complete the diagram which explains how the process operates as a generative project learning model. The smaller learning loops are combined with the SECI model to represent the learning activity during the lessons learnt workshops conducted at key phases of the project.

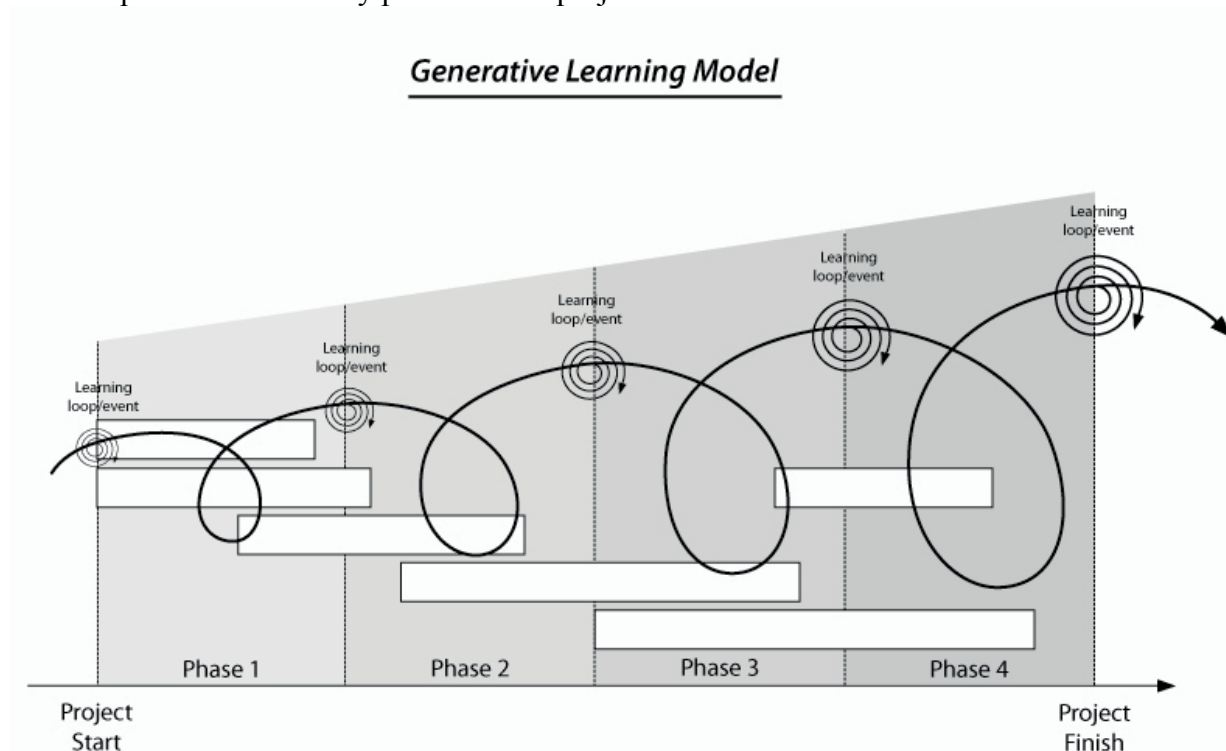


Figure 9: Generative project learning model

This model can be used as a framework for further investigation into the dynamics of learning in project-based environments and help to evaluate process and tools to improved project, organizational and wider stakeholder outcomes.

4.6 DISSEMINATION

The results and associated outcomes of this research have been disseminated widely in order to encourage others to understand project learning processes better, improve their practice and realise the associated benefits. This has been through the pilots, workshops and presentations run internally in the sponsors' organization. The wider dissemination has been through the publication of the journal and conference papers, an article in a widely circulated research publication and this thesis (see Table 4 Research map). Further publications are planned and the development of a web site is under consideration.

4.7 SUMMARY

This section discussed the research undertaken in each phase and outlined how the results contributed towards meeting the research aims and objectives. The findings are discussed in more detail and overall conclusions drawn in the next section. Further details may also be found in papers included in Appendices 1-4.

5 KEY RESEARCH FINDINGS AND CONCLUSIONS

5.1 INTRODUCTION

This section summarises the key findings of the research, highlights the contribution to existing theory and practice, the impact on the sponsor and the implications for wider industry. It provides a critical evaluation of the research, recommends areas of further research and, finally, states the overall conclusions. Further details on the research findings and conclusion can be found in the relevant sections of Papers 1 – 4 included in the Appendices 1 – 4 respectively.

5.2 REALISATION OF AIM AND OBJECTIVES

The aim of this research was to improve project learning processes through the identification and subsequent application of relevant organizational learning and knowledge management theories in a pragmatic manner. The research was focused on engendering greater ownership of lessons learnt processes by project team members and increased sponsorship from management for their implementation through an emphasis on benefits realisation. The specific objectives for the research are as follows.

- To review existing research on learning in project-based organizations in order to identify potential models for informing learning practice within the support services environment.
- To critically evaluate existing project learning processes within Mouchel.
- To develop a practicable time-efficient approach to capturing lessons learned and benefits measurement.
- To develop and validate approaches for propagating project learning across the wider business.
- To generalise a new theoretical framework for the application of learning theory in project-based environments.

A summary showing how this research has satisfied these objectives is provided in Table 12 below. The findings are examined in more detail in the subsequent sections.

Table 15: Summary of research findings

Overall Aim: To improve project learning processes through the identification and subsequent application of relevant organizational learning and knowledge management theories.		Evidence				
		Paper 1	Paper 2	Paper 3	Paper 4	Thesis
Research Objectives	Findings					
Phase 1 To review existing research on learning in project-based organizations in order to identify potential models for informing learning practice within the support services environment.	The key areas for further investigation to identify suitable concepts and tools are Organizational Learning, Learning Organizations, Knowledge Management and Intellectual Capital.	P	S	S	S	S
To critically evaluate existing project learning processes within Mouchel.	Current processes focussed on competences to create a 'high performance' culture mainly through the efforts of individuals. A more strategic approach was needed to overcome barriers to successful culture change. Barriers identified were: pressures of time; shortage of resources; and, lack of understanding.	S	P	S	S	S
Phase 2 To develop a practicable time efficient approach to capturing lessons learnt and benefits measurement.	A pragmatic approach based on knowledge integration that propagates duetero-learning or a 'learning to learn' culture focused on benefits measurement may overcome many of the barriers identified in Phase 1.		P	S	S	S
	There is a need to improve the operationalization of the theories mobilised to bring them into practice. In this case, through a focus on benefits and the use of terminology that the actors at all levels can understand.		P	S	S	S
Phase 3 To develop and validate approaches for propagating project learning across the wider business.	Key concepts that can be mobilised to understand further and improve the processes involved in project learning are boundary objects, knowledge spiral, 'ba' 'open-space' facilitation, and action research.			P	S	S
	Challenges that this approach overcomes are; obtaining buy-in, understanding complex theories, creation of right conditions, application of learning, benefits measurement and sharing lessons/outcomes.	S	S	P	S	S
	Project learning processes can be improved by using a pragmatic event-based approach to project knowledge integration that propagates duetero-learning across the whole project lifecycle.	S	S	S	P	S
Phase 4 To generalise a new theoretical framework for the application of learning theory in project environments.	The 'generative learning' model developed explains how the relevant theories have been combined and fills the need for a model which explains how the theory is applied in a simple manner. This will aid the understanding of others who might wish to adopt the approach or extend the research into other contexts.		S	S	S	P

5.3 PHASE 1 FINDINGS

The review of the literature and the existing organizational learning related initiatives identified a number of key areas for further investigation to identify suitable concepts and

tools to aid the implementation of a learning culture in the case study organization. These were Organizational Learning (OL), Learning Organizations (LO), Knowledge Management (KM), and Intellectual Capital (IC). In addition, the main barriers to successful implementation were identified i.e. organizational culture, employee resistance, defensive routines, unstable workforce, poor IT infrastructure and lack of; processes; finance; time; resources; business case and focus. A key finding was that a highly pragmatic approach based on knowledge integration that propagates duetero-learning or a 'learning to learn' culture focused on benefits measurement may overcome many of these barriers. These findings addressed the two research questions for Phase 1:

- What are the key learning and knowledge management theories that apply to project-based organizations?
- How is organizational learning and knowledge management currently applied in practice?

5.4 PHASE 2 FINDINGS

The results from the three pilots covering learning in three different contexts consultancy assignments, assurance and management development, demonstrated that a number of barriers could be overcome through the methods used i.e. duetero-learning and empirical benefits measurement methods. These were management buy-in, lack of business case, learning culture, employee resistance, viewed as a separate activity, understanding complex concepts, bottom line focus, challenging the status quo. The relationship between the different pilots and overcoming the barriers is shown in Table 7.

The consultancy engagement framework pilot demonstrated a process for identifying lessons, subsequent implementation and measuring benefits and their measurement throughout a projects' lifecycle. The Assurance team learning pilot attempted to introduce a 'learning to learn' cycle but showed that the abstract concepts involved need to be explained in terms the actors could understand, in this case the well known Plan-Do-Check-Act model. The management development learning pilot demonstrated further a learning to learn (duetero-learning) cycle could be set-up to change organizational culture.

The pilots revealed the need to improve the operationalisation of the theories mobilised to bring them into practice i.e. improve *praxis*. In this case through a benefits focus and the use of terminology that the actors at all levels can understand rather than detailed explanation of the abstract theories involved. On the topic of measurement it was found that empirical measurement was likely to be the best method due to the often complex, intangible and diverse nature of benefits. These results addressed the two research questions for Phase 2:

- What theories and approaches can be used to propagate duetero-learning?
- How can an event-based approach with a benefits focus assist in overcoming barriers to project-based learning?

5.5 PHASE 3 FINDINGS

In this phase further key concepts were identified and mobilised to understand the processes involved and overcome challenges identified in the previous research phases. The concepts were boundary objects (Wenger 2000), knowledge spiral (Nonaka and Takeuchi, 1995), concept of ‘ba’ (Nonaka et al 2000), ‘open-space’ facilitation (Owen, 2008) and action research (Eden and Huxham, 1996). The relationship between theory and how the event processes overcame the challenges is shown in Table 13 below.

Table 16: Relationship between theory and overcoming challenges

Challenge	How it was addressed	Contributing Theory/Concept
Obtaining the ‘buy-in’ of management in particular and other actors/stakeholders	Pre-work & initial briefing to management on the process and expected outcomes and financial benefits Time-boxed approach Cyclical process for large scale multi-phase projects Highly flexible Dynamic and interactive Voting process Consensus prioritization Emphasis on quantifiable benefits	Duetero-learning
Understanding complex/abstract theories	Event-based presentation of theory. The participants are closely facilitated in such a way that they act out the theories/concepts themselves. i.e. they learn how to learn through participation in more than one event.	Action research Duetero-learning
Creation of the right environmental conditions (time & space) for learning	Workshop process in particular use of open space techniques Multiple facilitators Use of event recorders to capture outputs as they are produced Phase based approach	‘Ba’ space Open space facilitation Reflective practice Duetero-learning
How to apply the learning successfully	Benefits realization cards – capture thinking and communicate it outside the event Use ‘buy-in’ of management at early stages	Boundary objects Action research
Improving measurement of benefits	Focus on measurement of benefits early both size and actual methods of measurement/monitoring Identify links to corporate objectives	Boundary objects
Sharing of lessons and outcomes	Rapid dissemination – make it newsworthy Accessible through use of an ‘eBook’ as a repository	Boundary objects

This phase demonstrated how project learning processes can be improved by using an event-based approach to project knowledge integration that propagates duetero-learning, generates outputs that codify lessons learnt and promotes measurement of benefits. The event and the outputs, in effect, take the form of ‘boundary objects’. These act as a bridge or means of translation between the actors and to those who will use the learning to improve their own project practice on future projects. These results addressed the research question for Phase 3:

- how can *praxis* aid the development of improved lessons learnt processes in projects across organizations?

5.6 PHASE 4 FINDINGS

The final phase of the research addressed the research question concerning the need for existing theory to be communicated in a more understandable manner? It achieved this through the development of a ‘generative learning’ model which shows, in a simple graphical manner, how the theories of duetero-learning (Argyris and Schön, 1978), learning spirals (McNiff, 1998) and knowledge spirals (Nonaka and Takeuchi, 1995) have been combined. The model can then be used to demonstrate the cumulative effects of learning throughout the project lifecycle if duetero-learning has been propagated. The model can also be used by others who might wish to adopt the approach or extend the research into other contexts.

5.7 CONTRIBUTION TO EXISTING THEORY AND PRACTICE

5.7.1 OVERVIEW OF THE CONTRIBUTION

The research has made a contribution to both existing organizational learning theory and the way it can be applied in practice. The empirical approach to the development of the methodology allowed the use of a variety of concepts, techniques, tools and theories rather than adopting a narrow approach linked to one particular field of research. It gave the researcher the opportunity to use various theories as ‘lenses’ to gain insights into the dynamics of project learning, act as a reflective practitioner and improve *praxis* i.e. learning theory has been brought into practice by seeking to incorporate it into project lifecycle processes. The findings demonstrate how the research has answered the research questions formulated to address the overall aim of improving project learning processes through the identification and subsequent application of relevant organizational learning and knowledge management theories in a pragmatic manner.

A key contribution to theory is the way the research has been conducted at the nexus of a number of different theoretical positions i.e. organizational learning, learning organizations, intellectual capital, knowledge management and boundary objects. This has resulted in the coalescence of these theories in the form of a generative learning model. This model aims to provide a better understanding of how a learning to learn culture based on creating time and space for personal reflective practice can be propagated by using an event-based approach in project environments.

The research has, in addition, extended the application of existing theory in the fields of KM and Organizational Learning in project-based contexts. This was achieved by explaining these

theories in a way that practitioners can understand by causing them to be enacted in practice i.e. through improved *praxis*. The complex theories have been turned into tools for actors to use in expanding their reflective practice which improves their work and the outcomes from their activities. Use of the concept of boundary objects, which have a highly flexible nature, gave an explanation as to how the event-based process enabled the exchange of knowledge on lessons learnt amongst actors from different ‘worlds’.

Through the synergistic use of the theories employed the research supported the development of reflective practitioners by allowing the actors to develop the necessary skills to generate duetero-learning or ‘learning how to learn’ through the cyclical nature of the process developed through the project lifecycle. They can then share the approach and the resultant learning with others to further propagate duetero-learning across the organization. The event process itself can be adapted for a variety of scenarios and used by an organization or group of organizations to improve and apply learning more successfully.

5.7.2 IMPACT ON THE SPONSOR

This research has been a practice driven approach aimed at improving organizational learning in the sponsors organization by; changing the practice of capturing lessons learnt in a project context; improving the take up and implementation of project-based learning; providing focus for the measurement of the resulting outcomes. The main impacts have been in the RE’s Business Unit which formed the main unit of analysis for the study. The main improvements occurred in the research engineers own internal consultancy operations, the management development programme and the IT systems implementation roll-out project.

In the case of the internal consultancy the Assurance based learning pilot outlined in section 4.3.3 resulted in the development of processes to promote new thinking amongst the team through use of a quarterly review cycle. This was designed to develop duetero-learning that encourages reflective practice amongst the team members. In addition, it supported the move to a business review approach (rather than the traditional audit) linked to achievement of business objectives and measurement of benefits.

Another area to benefit concerned the consultancy engagement process for carrying out projects within the researcher’s business stream. This employed duetero-learning concepts to produce an approach designed to capture lessons, aid their implementation and record benefits throughout a projects’ lifecycle.

Finally, the management development programme benefited from the introduction of an action learning based approach which promoted reflective practice thinking and organizational culture change focused on benefits realization.

Application of the new approach project-based support service delivery areas involved in infrastructure construction and maintenance has resulted in the implementation of Learning Organisation principles and the promotion of a culture of benefits realisation.

The research had a number of impacts on the IT systems implementation roll-out project. Due to the time-limited design of the workshop process it allowed the project manager to carry out lessons learnt and benefits realization at a critical moment in the roll-out. The pilots also enabled the identification of multi-£m areas of benefit and the buy-in of senior management to implement the changes identified through the workshop process.

In order to assist the roll-out of the new approach further an implementation guide has been developed as shown in Figure 10 below.

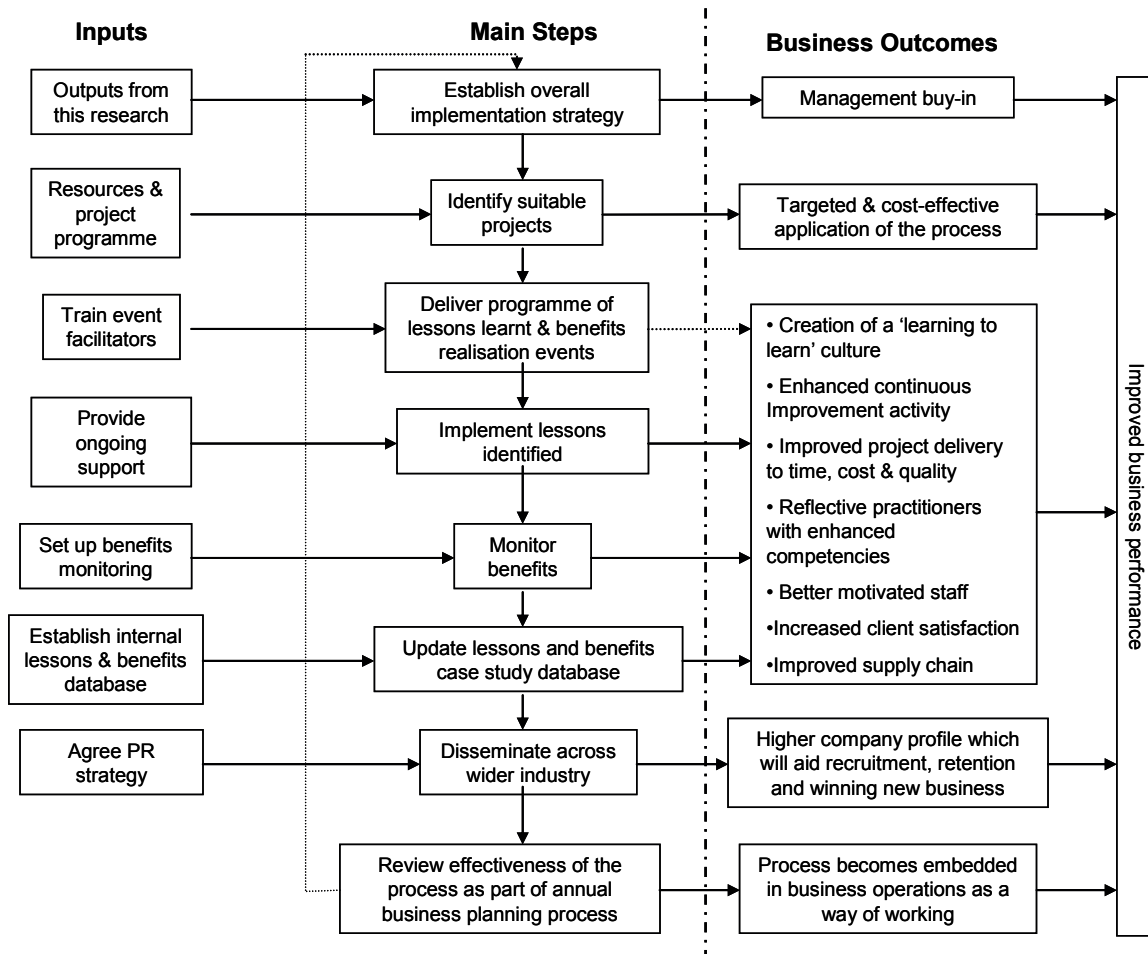


Figure 10: Outline implementation guide

The guide shows how the results of the research can be used to benefit both the RE's Business Unit (the main unit of analysis) and the wider organisation and industry in general. In particular, it provides the key steps to be followed and highlights the benefits of implementing the approach in terms of business outcomes which can be used to obtain the support of key decision makers. The overall aim is for the process to become part of the normal business activities that propagates a 'learning to learn' culture rather than a special 'one-off' activity.

The project has had a considerable positive impact on other activities within the sponsoring organization including the following.

- Innovation process development. Introduction of learning from previous implementations in a systematic manner. Promoting and delivering innovation for sustainable development with cross-project shared learning
- Management conference "Innovation in Action". Concepts from academic activity/liaison used to promote new thinking amongst managers e.g. Duetero-

learning, reflective practice through improvisation acting techniques and involvement of client.

- Academic forum. Contacts with Loughborough University academics have enabled this forum to be quickly set up with participation from other institutions i.e. Brighton University, Hatfield University and University of Central England.
- Knowledge management. Development of an integrated approach to Knowledge and learning. This led to the integration of sustainable development with the innovation process to accelerate learning and sharing of best practice.

5.7.3 IMPLICATIONS FOR WIDER INDUSTRY

In industries that operate in knowledge intensive project environments there is an ever growing need to improve performance in less time and for reduced cost. It is of increasing importance, therefore, for companies to learn, capture and implement as many lessons as possible from past project activity.

The research has shown that practice in the area of lessons learnt is inconsistent, if carried out at all. This becomes wasted resource as mistakes and poor delivery are repeated time and again. Introducing robust processes in this area is not easy and the challenges have been identified and experienced in the course of this study. However, the feedback from the participants and the limited sample of wider expert project management community shows that this process has the potential to overcome many of the challenges and barriers to project learning. The event-based approach has been designed to overcome some of the key issues including obtaining management and staff buy-in and dealing with the time pressures that exist in project-based environments.

In summary, the approach can be used to change the way project lessons are viewed, valued and operate across industry.

5.8 CRITICAL EVALUATION OF THE RESEARCH

This study has been undertaken as a longitudinal case study with the majority of the activity carried out as action research by aligning the research topic to the researcher's role. During the four years of the study there have been many changes to both the organization and to the researcher's role. This has also included several changes of industrial supervisor. This has raised significant challenges in maintaining a coherent line of research which has been achieved by adopting a flexible approach. Key to this has been the adoption of qualitative research methods and a research plan that has enabled a multi-faceted approach which has been used to guide the research to a satisfactory conclusion. Due to the empirical nature of the research and a lack of a large enough sample sizes it was not possible to employ any quantitative methods to carry out statistical analysis on the data obtained.

In qualitative research validity does not have the same meaning as in quantitative research and is based on establishing how accurate the findings are from a number of viewpoints, the researcher, the actor or readers of the output (Cresswell, 2009). He goes on to recommend multiple strategies for checking the accuracy of findings. This study has incorporated a

number of these including triangulation, member checking of transcripts, rich description of findings, self –reflection on bias, use of negative results, and spending time in the field. Embedded units of analysis were used to provide a greater richness of data although according to Yin (2003) care needs to be taken to make sure the analysis relates back to the overall case study. More work is needed to establish the benefits realisation aspect of the study and also to replicate the study in other contexts in order to corroborate the results further.

A related topic is qualitative generalization or analytic generalization that Yin (2003) applies to generalizing the study to particular theory which is attempted in this research through theory development as a lens for use in future studies. Cresswell (2009) sees the value of qualitative research as its applicability to a particular context or particularity as being the characteristic of qualitative research.

In terms of this research the approach has only been applied within a single support services organization using a limited number of small scale pilots, surveys and interviews. The model and the methodology developed need further testing in practice to establish the effectiveness of the approach over time. This will need to take the form of benefits monitoring through a number of full project lifecycles followed by analysis of the results to examine causality. The conclusions drawn, therefore, need further substantiation, through future studies related to this or similar approaches. A further limitation to the actual delivery of the approach is the need for multiple facilitators with the right skills to manage the dynamics and time-limited nature of the event and the need to produce credible outputs on the day.

5.9 RECOMMENDATIONS FOR INDUSTRY

The research has developed a new approach to improve project management practice in the area of lessons learnt and benefits realisation which can now be implemented within the case study business unit which was the focus of this study and the parent organization. The approach can also be promoted to improve project management practice across the wider construction industry. The first step will require the preparation and approval of an overall strategy for implementing this approach which takes into account the following key recommendations resulting from this work which are as follows.

In the case study business unit:

- set up a benefits monitoring process to capture the outcomes from implementing the lessons
- integrate the approach and the results into the case study business units' project management methodology, change and continuous improvement programmes
- finalise and publish the implementation guide
- train additional facilitators to deliver the events
- implement the process across the case study business unit
- create a database of lessons and benefits case studies accessible via the intranet
- highlight key lessons and results obtained on intranet news pages

In the parent organization:

- establish pilot events across the wider business to obtain management buy-in prior to further roll-out of the approach based on the case study business unit recommendations

- integrate process into the company's policies and procedures covering project management activities
- publicise results in company publications

For wider industry:

- develop the dissemination approach to publicise the results to wider industry via conference papers, journal papers, industry publications and web channels.

5.10 RECOMMENDATIONS FOR FURTHER RESEARCH

Further research could investigate how this type of approach can be fully embedded in an organization by improving the processes of dissemination and implementation. The outline implementation guide has been produced as a tool for others to use in adopting the new approach. Another area of further investigation would be the adaptation of the process so that it can be applied to small groups or using a virtual workshop approach. The latter could use a mix of face-to-face and webinar/video-conferencing multi-session short duration events.

The generative project learning model could be used as a framework for further investigation. It could be used as a multi-faceted lens for future researchers to study project learning further to gain a better understanding of the dynamics involved and what further improvements could be made to project learning processes, tools and outcomes.

This research also provides a foundation for developing this approach in a wide range of contexts. Particularly, where the use of events is a key element and there is a need to gain consensus, capture outputs and share understanding e.g. strategy development, business planning, team building, change management.

5.11 SUMMARY AND CONCLUSIONS

5.11.1 SUMMARY

This study set out to address the problems that organizations face in successfully exploiting lessons learnt in multi-phase project environments. A key finding has been that project learning is a highly complex social process that is dependent on creating the right environments (both project and organizational), processes and tools. These need to be effectively combined to capture, disseminate and successfully implement lessons learnt. An event-based approach has been developed to achieve this and a 'generative learning' model developed to explain how the relevant theories have been combined. The model can be used to explain how this improvement occurs over time if a duetero-learning culture has been established. The combined phenomena of knowledge conversion, duetero-learning (learning how to learn) and boundary objects generate outputs that codify the lessons learnt are used by the actors involved and others in successive project phases or new projects.

This research has been a *praxis* driven approach aimed at; changing the practice of capturing lessons learnt in a project context; improving the take up and implementation of project-based learning; providing focus for the measurement of the resulting outcomes. The research demonstrates that event based approaches can be used to capture learning for re-use in

projects. The pilot events suggest that the methodology developed enables a 'learning to learn' and benefits measurement culture to be propagated amongst project implementation teams. The key outcome is the empirical demonstration of the benefits of implementing learning across the full lifecycle of a project. The study has also shown how the body of research may be grounded through a longitudinal case study designed to bring about improved *praxis*. However, persuading an organisation to think in these new ways is a complex and difficult task. This is overcome, in part, by not referring to the complex theories involved and instead focusing on the beneficial outcomes from applying the new methodology.

5.11.2 CONCLUSIONS

The key conclusions from this study are as follows:

- project learning processes can be improved in multi-phase projects by employing event-based mechanisms developed primarily from Organizational Learning, Learning Organizations and Knowledge Management concepts. The approach developed is designed to create an environment where a culture of 'learning how to learn' is propagated (Argyris and Schön, 1978). The processes used overcome some of the key barriers to the effective capture of lessons learnt and their subsequent implementation i.e. shortage of time, different learning styles of individuals, lack of effective capture mechanisms, poor articulation of benefits realisation, lack of management sponsorship.
- in attempting to create a 'learning to learn' culture and develop 'reflective practitioners' (Argyris and Schön, 1978) event-based enactment of complex/abstract theories can be used as a tool to create improved praxis by overcoming the need to explain the theories to the actors involved.
- theories from different literatures i.e. Organizational Learning, Learning Organizations, Knowledge Management, Intellectual Capital Measurement, Boundary Objects can be successfully combined to provide a 'generative' learning model that can be used as a multi-faceted lens to study the dynamics of learning in multi-phase project environments.

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Appendix A - Paper 1

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LEARNING ORGANISATIONS: CAN THEY BE SHOWN TO EXIST THROUGH THE REALISATION OF QUANTIFIABLE BENEFITS ?

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ABSTRACT

Learning Organisation concepts and their implementation have been debated for over fifty years. This paper constructs a position on how learning propagates within a knowledge intensive firm based on extant theory. The key purpose of the research is to establish how the effects of organisational learning can be measured in a knowledge intensive business in the support services sector. Learning Organisation research areas reviewed included studies on Learning Organisation strategy and implementation in the Construction/Project based sectors. Related key topic areas were; measurement; realisation of benefits; and valuation of knowledge assets. The aim is to outline a bridge between Organisational Learning and the knowledge practitioners undertaking the learning. The review examines whether the quantifiable measurement of benefits from Learning Organisation implementations can provide ‘evidence’ that organisations can learn in a meaningful and beneficial way. The paper reveals that this requires enabling learning as part of normal activity. The ongoing research is aimed at taking the learning from this review to develop strategies for implementing a learning organisation culture in the sponsoring organisation and quantifying the outcomes.

Keywords: benefits realisation, knowledge assets, learning organisation, organisational learning, strategy

INTRODUCTION

The topic of Learning Organisations and Organisational Learning has been analysed and debated for over 50 years. The fundamental issue as outlined by Donald Schön is about learning to learn and the need to develop ‘Learning Systems’ to bring this about (Schön 1971). However, research has continued with exponential growth achieved in the early 1990’s. This growth was identified by a study by Crossan and Gatto (1996) of the topic’s research profile based on the results of a keyword search using the terms “organizational learning” and “learning organization” in the Social Science Citations Index (SSCI), ABI/Inform and PsychLit databases.

In the last few years there has been increasing interest in organizational learning within the construction sector in response to some of the issues raised by the Latham Report “Constructing the Team” (1994) and the Egan Report “Rethinking Construction” (1998). These reports covered a wide area with a focus on procurement methods, customer focus, partnering and alliances, leadership and the wider team, improving efficiency and quality, and

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reducing costs in a project based environment. However, to date there has been little research which has systematically examined learning within the sector or how it plays out in different types of knowledge-intensive firm. This paper constructs a position on how learning propagates within a knowledge intensive firm in the support services/construction sector based on extant theory. It brings together different bodies of theory around this aim and also sets out to establish how the related benefits can be realised and measured. This provides a backdrop for an ongoing research programme which is seeking to develop an understanding of how the effects of organisational learning can be measured in knowledge intensive business support services.

KEY CONCEPTS

ORGANISATIONAL LEARNING AND LEARNING ORGANISATIONS

In the course of the literature review the early work of Argyris and Schon is cited but in recent times is rarely covered in detail. However, there are important concepts that are still relevant. By examining them in their original context they can provide greater insight into the meaning of Learning Organisations and their implementation.

According to Argyris (1992) academics researching Organisational Learning usually have a sceptical approach revolving around three main challenges (p.1):

- Organisational learning is contradictory
- If it does exist then is it always beneficial
- Do real organisations learn productively and are they capable of doing so

Schön had already published a book entitled 'Beyond the Stable State: Public and private learning in a changing society' in 1971. It was based on contemporary events and is about Public and private learning in a changing society and is a personal reflection of the stable state, its loss and beyond. Concepts covered included societal change, diffusion of innovation, dynamic conservatism, learning systems, the business firm as a learning system, public (individual) learning, Government as a learning system.

In their paper entitled *Theory in Practice* (1974: 2 -4) Argyris and Schön proposed the concepts of single loop learning, double loop learning, theories-in-use and espoused theory. Single loop learning is where errors are detected and corrected but the organization continues with their current policies and goals. Double loop learning is when error is detected and corrected in ways that involve the modification of an organization's norms, policies and objectives. Theories-in-use are the mental maps which guide interpersonal behaviour, the behavioural worlds we live in, our effectiveness and capacity for learning rather than the theories people explicitly espouse which are theories-of-action.

They recognised that this early work was not linked sufficiently with the concept of organizational capacity for learning. A conceptual bridge was needed between individual and organisational behaviour which is covered in their next book Argyris and Schön (1978).

A number of key definitions were proposed:

Organisational Learning:

“Organizational learning occurs when members of the organization act as learning agents for the organization, responding to changes in the internal and external environments of the organization by detecting and correcting errors in organizational theory-in-use, and embedding the results of their inquiry in private images and shared maps of the organization.” (p.29)

In practice, this means that certain employees have the organisational ‘freedom’ or are mandated to review existing routines which are not performing correctly. This may be as a result of changes to the business environment. They are empowered to propose changes which are then communicated to individuals or groups of individuals by sharing their own mental images of the improvements needed with individuals and to the rest of the organisation through any resulting changes to the formal organisation structure charts.

Duetero learning –

“When an organisation engages in duetero-learning, its members learn, too, about previous contexts for learning.” (p.27) . This type of learning is about applying organizational learning concepts to the learning process itself. The focus is on analysing successes and failures. From this the barriers to learning can be identified. Strategies can then be developed to overcome these barriers which are then communicated to the individuals in the organisation and implemented.

In a later book Argyris (1992) promoted Organisational Learning as a “competence” (p.i) that all organisations need in order to improve detection and correction of errors and, in turn, improve their potential to innovate. A strong emphasis was placed on errors that may cause embarrassment to the individual or may even be threatening in some way and which have the potential to become barriers to learning at all levels within the organisation. He argued that, whilst the research literature covering the Learning Organisation produced by practioners tended to be prescriptive and that covering Organisational Learning produced by academics tended to be sceptical. They are complementary in that, one ignores what the other finds of crucial importance but both are about whether real organizations can in fact sustain a learning organisation culture. He also recognised the difficulty of creating a learning organisation by the reference to the need to establish, through interventions, the “rare” conditions necessary that make it part of everyday working.

The key concepts related to the proposed research are the ideas and lessons to be drawn concerning productive learning i.e. double-loop and duetero-learning; identifying and overcoming barriers; defensive routines i.e. mechanisms developed at the individual, group, managerial levels and organisational level to overcome embarrassment in identifying errors; and, the adverse consequences of Human Resource based interventions and of the researchers themselves in carrying out their studies. There is little reference to the actual quantification of benefits related to interventions that would bring about Organisational Learning i.e. the creation of a Learning Organisation.

A more recent empirical study, in an educational institution context, examined a reflective-action learning group framework as an organisational learning enabler (Yeo, 2006). The framework was designed to create a learning ‘space’ (c.f. Lewin (1951), Lave and Wenger (1991), Kolb and Kolb (2005)) i.e. which is not constrained by physical or institutional boundaries. The discussion of the study’s survey results extended the single/double loop learning concepts (Argyris & Schön 1978) into a triple loop model which described single

loop learning as related to competence, double-loop learning as related to capacity and triple loop learning related to competitive advantage of the *individuals*. The study demonstrated that reflective-action learning is aligned to Kolb's (1984) experiential learning cycle. In terms of recommendations covering implementation of reflective-action learning in an organisation there was useful table relating the stages in the framework to the critical success factors, organisational learning and organisational effectiveness.

The Organisational Learning theorists have continued to debate the existence of organisational learning whilst the Learning Organisation practitioners have continued to develop, expand and refine their approaches to implementing the ideal of a learning organisation. An overall common theme is systems thinking but more recent work has covered the existence and development of routines to overcome the increasingly dynamic nature of our world.

Implementation approaches

Sector related studies, such as Jashapara (2003), have shown that organizational learning leads to increased organizational performance. In this case the results were based on a qualitative survey based instrument using economic and human resource dimensions. The conclusions drawn were that this is achieved through double loop learning creating competitive advantage; it is competitive or political cultures that are more likely to promote double loop learning; due to competitive forces firms need to align their learning on efficiency and proficiency to respond to these. It concludes that people need to align their day-to-day learning to a continually changing external environment.

Styhre et al (2006) examined organizational learning in the context of 'craft' based construction workers. They concluded that in the case of these workers communities of practice that rely on non-verbal rather than written interaction are the key to developing more effective learning.

A paper by Hosely et al (1994) introduced of the concept of competitive forces and the need to focus on these as part of the drive for strategic change whilst promoting a learning culture. This is highly relevant to the case study organisation in the proposed research in terms of its growth ambitions in expanding markets and new sectors. It also has strong links to the research area of dynamic capabilities which will be explored in the proposed research as time permits. A contemporary study by Hosely et al (1994) examined "competitive learning" and proposed communication as the vital link, in particular the promotion of active-listening. The model developed was based on a dynamic approach to learning based on the assumption that organizations develop unique solutions based on competitive forces.

The importance of individual and organisational learning was emphasised by Pedler (1995). Decisions are required as to how an organisation intends to use the learning at all levels both individually and collectively including wider stakeholders. Organisations need to collaborate in order to understanding learning, learning about learning, and implementing learning. His concluding comment was the notion that "Becoming a learning company is more of a *journey* (emphasis in original) than a destination."

A key finding in the Diez *et al* (2005) study was the uncovering of the aspiration of the *individuals* to work for a learning organisation at some stage in their working life. This relates directly to Senge's (1990) definition of a learning organisation which contains the concept of collective aspiration. In the case study the organisation had moved from being state run national institution to a private multi-national company. This relates closely to the market

environment the proposed research case study will examine i.e. central and Local Government Contracts with transfer of government employees to deliver the services.

The debate has widened to include knowledge management issues. In a joint benchmarking study by the European Foundation for Quality Management (EFQM), American Productivity and Quality Center International Benchmarking Clearinghouse (APQC/IBC) and the Knowledge Management Network (KMN). The result was a Good Practice Report (1997) on “Knowledge Management and the Learning Organisation”. A Site Visit Questionnaire instrument was used to guide the capture of best practice in six topic areas General Issues; Case for action; Strategy and Objectives; Implementation; Measurement and Business Results.

A study by Holt *et al* (2000) outlined a learning framework for strategic construction alliances based on system thinking for developing mutually beneficial learning. The approach was outlined using a case study on an SME construction company’s exclusive alliance with a large insurance company.

Easterby-Smith *et al* (2000) demonstrated that the focus has now moved to studies at the organizational level and was even moving further to encompass studies of learning across boundaries and between organisations. Similarly, they examined the “territorial debates” covering organizational learning and knowledge management based on the work of Nonaka and Takeuchi (1995: pp44 - 46). They concluded that this work gave a too narrow definition (based mainly on the work of Senge 1990) of organizational learning. They argued that the ability of individual behaviour to understand organisational level events is not feasible and that there is a paradox due to the need for external assistance with the required interventions. Another related issue covered was the approach of Brown and Duguid (1991) and their concept of knowledge development as a key result of learning which is endorsed by Nonaka and Takeuchi.

Garvin (1993) links organisations with knowledge and learning in simple terms. He introduces measurement as one of the three key issues unresolved by the theorists – meaning (or understanding of the concepts), management and measurement. Also, the need to provide a suitable environment for learning which creates time to learn, gives training in related core skills and opens up boundaries. A further study by Blackman & Henderson (2005) investigated the effects on learning and knowledge based on the Senge (1990) disciplines of shared mental models (i.e. company vision) and systems thinking.

In terms of implementation lessons learnt Kiedrowski (2006) raised diffusion of commitment through the middle management layers, improved training and development to institutionalize culture change, emphasis on cultural rather than structural change, re-use of existing survey data would appear useful to provide the ability to measure consistently prior years in order to provide a baseline for improvements.

The study by Dovey and White (2005) investigated learning in a knowledge intense organisation where the goal was transformational learning to promote a culture of innovation. Concepts such as social capital, power management and the role of the “external critic” were explored. There are some interesting parallels with the case study company for the proposed research in terms of the history of the firm and the knowledge intensive environment. Issues around action research and the impact the researcher may have on the environment were also studied. This theme was also explored by Lalle (2003) and concluded that the ‘actor researcher’ has two limitations. Firstly, the lack of independence in terms of gaining access to other areas outside their role. Secondly, a lack of neutrality which can be beneficial in terms of “reality-building interventions”.

A number of the studies examined concluded that there is no one best way for implementing a Learning Organisation e.g. there is no one roadmap, Senge *et al* (1994); “It may not be possible or wise to undertake a “Senge-only” LO intervention” Kiedrowski (2006); and, organizations develop their own unique answers to address the competitive situations they exist in, Hosely *et al* (1994). This supports the view in the proposed research to use a hybrid strategy that takes the best from all the competing concepts.

Finally, although some studies covered the information technology based ‘knowledge’ economy companies it was not apparent that the research has covered all the issues related to high growth acquisitive ‘industrial’ economy companies that are still in the process of entering the still relatively new (in socio-economic terms) ‘knowledge’ economy.

Benefits Realisation and Measurement

In terms of measurement of Learning Organisations a number of the papers reviewed proposed frameworks and models which were then used as the basis for qualitative assessments. Few, if any proposed quantifiable methods and tools. This was probably due to the lack of real world studies in particular, in the construction support services sector. In order to cover this field it was necessary to cross into the knowledge management and intellectual capital research literatures to locate the research into valuation techniques.

In the construction/contracting sector a conceptual research framework was developed by Wong and Cheung (2005) which drew on recent work from, among others, Kululanga *et al* (2001, 2002) covering organisational generative learning and Jashapara (2003) mentioned above. The aim was to guide research to assist the goal of sustainable continuous improvement by bridging between the research into project monitoring and research in organizational learning. The framework was used to evaluate existing research in order to link past studies with proposed studies. It concludes ‘it becomes instrumental to demonstrate the learning effects in construction organisations in real situation (sic). It suggests that the ‘learning curve’ model is the best method for demonstrating Organisation Learning effects in real situations. A further suggestion is to investigate the use of data from performance monitoring systems.

One study that did cover real world issues was the EFQM/APQC/IBC/KMN Good Practice Report (1997). The findings included the following key findings under measurement and monitoring - “Intellectual capital indicators should be developed with employee participation” and interestingly - “No measurements were found for changing human capital into structural capital”. Under business results the single key finding was “Leveraging future earnings is more important than cost savings, but tangible benefits have been reported”. No details were given for the actual measurement processes used or results obtained.

Whether organisations can learn or not they can as a collective increase their effectiveness and competitiveness by applying the theories proposed by the Learning Organisation researchers covering all levels of learning, individual, team, organisation, institution, governmental and wider society as envisaged by Schön (1971) in his book ‘Beyond the Stable State’.

There is a further opportunity to link this area of work with that of implementation of Learning Organisations in an area that is not covered well in research in terms of monitoring realisation of benefits and quantifying the value of learning and knowledge gained i.e. the appreciation in knowledge assets. The selection of the right method is crucial and the ability to communicate it both within the organisation and externally to stakeholders is of key

importance. The ability to measure will assist in closing the gap between the Learning Organisation practitioners and Organisational Learning academics. The proposed research will provide evidence, providing there is a causal link, that organisations can learn in a meaningful and beneficial way and the barriers overcome in order to achieve the goal of creating the right conditions for learning as part of normal everyday activity.

The research needs to take into account the difficulties in measuring intangibles are referenced in Lev (2001) "...to improve managerial processes for coping with the idiosyncratic challenges posed by intangibles - spillovers of benefits (partial excludability), high risk, and non tradability; and to develop measurement and valuation tools for both managers and investors capable of rising to the major challenge....." p132. Sveiby (2004) also refers to this in that it is not possible to measure social phenomena accurately, it is fragile and open to manipulation. Measurement adds value only if the limitations are taken into account. The measurement of intangibles can uncover hidden costs or be used to explore other value creation opportunities i.e. with a 'learning motive' Establishing purpose of measuring intangibles is essential. The measuring process should be regarded as an 'invitation to a learning dialogue'.

A paper by Green and Ryan (2005) provides the basis for including intangible assets into a value chain aligned to business strategy which can be used to assist in providing better utilization of resources to sustain competitive advantage and create value. The context of this work relates closely to the proposed case study organisation in terms of approaches and methods for valuing knowledge assets in a knowledge intensive environment and, how intangibles might be viewed.

METHODOLOGIES TO BE EMPLOYED

The methodology for the ongoing research is based on a single case study of a company in its initial state without a formal learning organisation culture (Case Study organisation as-is state) and the company one or two years into implementing a learning organisation culture (Case Study organisation future state at the end of the research period). Part of the research will be to establish suitable measures to monitor the progress of the implementation and the realisation of benefits linked to the interventions put in place.

It is proposed to identify lessons learnt from both successful and not so successful Learning Organisation implementations that can be applied in a rapidly growing knowledge intensive support services organisation. This will be through an analysis of the literature already collected and in particular, case studies of companies that are perceived either by themselves or others to be learning organisations. Where possible, structured interviews will be held in a number of Learning Organisations and the responses analysed to identify suitable strategies, approaches and lessons learnt. Interviews will also be conducted with practitioners in the field. A similar exercise will be held within the company sponsoring in the research covering its existing Learning Organisation strategy and implementation activities and plans. A gap analysis will be conducted to identify areas where the learning from the research can be applied to modify the approach and propose a 'hybrid' strategy

In terms of measurement both quantitative and qualitative approaches will be considered. However, a key area of the current research project will cover the realisation and measurement of quantifiable benefits. This will be carried out by reviewing the approaches detailed in the current Intellectual Capital literature e.g. Sveiby (2001) who describes twenty-one methods for measuring intangibles, approaches on Lev's website and in his book Lev

(2001) and, the “framework for intangible valuation areas” proposed by Green & Ryan (2005) and developed further by Green (2006-1, -2, -3).

This type of analysis will be used to develop an approach for analysing the company from a knowledge asset viewpoint rather than the traditional financial “bottom-line” based view currently used. At this stage a number of approaches are under consideration and these include; change in employee value-added; employee fee income progression over time; employee salary market rate increase over time; opportunity cost savings due to increased retention rates

A key area will be to establish the causal links between the Learning organisation based interventions and the benefits identified. Ishikawa cause & effect ‘fishbone’ analysis will be used where appropriate. An investigation will also be carried out into the “unintended consequences” of the “bottom-line” reporting approach currently employed and its impact on the implementation of a Learning Organisation culture. Once the measures are developed they will be monitored over a two year cycle and an exercise conducted to check their validity.

CONCLUSION

The Organisational Learning theorists have continued to debate the existence of organisational learning whilst the Learning Organisation practioners have continued to develop, expand and refine their approaches to implementing the ideal of a learning organisation. An overall common theme is systems thinking but more recent work has covered the existence and development of routines to overcome the increasingly dynamic nature of our world.

This review provides a sound basis for carrying out the proposed ongoing research which will attempt establish causal links to provide evidence of the benefits realised from implementing a Learning organisation. Two basic research questions are proposed:

- Can organisations improve by learning and if the improvement can be measured quantifiably can this be used to prove that a learning organisation exists ?
- Can the causal links be established between the identified improvements and the interventions designed to create a learning organisation culture ?

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APPENDIX B - PAPER 2

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USING MEASUREMENT AS AN ENABLER FOR THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT AND LEARNING PROCESSES

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Abstract

Knowledge Management and Learning concepts are complex and difficult to express in common terms and as a result their implementation in practice is highly problematic. The literature shows that many of the barriers to success are common across both knowledge management and learning. This is where management need to be convinced of the real worth of what are perceived by many in industry as abstract theoretical concepts. Demonstration of identifiable benefits, both quantitative and qualitative, is considered a prerequisite to obtain a viable mandate for change. This paper reports on research which examines the measurement of knowledge management and learning as part of a longitudinal case study. The research is based in a rapidly growing knowledge intensive organisation which currently has an incremental approach to knowledge management and learning. Several initiatives exist which this research is drawing together in terms of benefits measurement. A common approach to measurement was adopted that did not differentiate between Knowledge Management and Learning. This simplifies the explanation of the concepts being presented to the actors involved. The various approaches to empirical measurement being developed are being tested through a series of pilot studies. These include knowledge based team learning and through lifecycle project learning. The research differs from many Intellectual Capital methods by taking a simple, highly pragmatic approach based on empirical measurement at the individual project level. The research reveals the types of measurement activities which can enable knowledge management and learning processes to be implemented. These can be used to capture and demonstrate the benefits of implementing KM and Learning tools and techniques into an organisation. Further areas of research planned include the examination of the use of a competency based approach to measuring improvements in the knowledge and learning of individuals, which can be aggregated to assess improvements across businesses as a whole.

Key words: Intellectual Capital, Knowledge Management, Learning, Measurement, Case Study

1. Introduction

The study of Knowledge Management (KM) and Learning has been carried out separately until recently when empirical studies have emerged examining the common elements and

barriers. Studies in the field of intellectual capital measurement have also started to look at both elements together. In the following paper these topics are examined in more detail to establish the role of measurement in supporting the implementation of KM and Learning.

The project which is the basis of the study is a longitudinal case study examining how the knowledge and learning capabilities of a knowledge intensive company can be measured. The case study company (the company) is a rapidly growing support services company operating primarily in the UK public sector/regulated industries sector. In terms of the specific area of activity to the researcher there is a strong construction bias. A review of the literature shows that there are strong links and therefore common barriers to implementing KM and learning.

The issues of explaining complex concepts and accommodating a bottom line focused culture are explored along with a discussion on the applicability of higher level Intellectual Capital Intangibles measures.

A number of approaches to empirical measurement are outlined. These are being developed and tested through a series of pilots. The relative merits of the approaches are discussed in terms of overcoming the barriers to implementing KM and learning. Finally, conclusions are drawn and suggestions for further areas of research made.

The paper speculates on whether empirical methods of measurement are more appropriate (successful) at measuring KM & Learning than Intellectual Capital(IC)/Intangibles methods. It also discusses the issue of whether a common approach be adopted across Learning and KM. If this is the case can this sort of approach then be used to overcome barriers to their adoption and be used to enable their implementation.

2. Review of relevant literature

Although KM and Organisational Learning (OL) have been researched for many years these have tended to be seen as separate disciplines. In recent years there have been a number of studies which have examined the links (Pemberton & Stonehouse, 2000), (Cavaleri, 2004), (Chinowsky and Carrillo, 2007). Latterly, in the Intellectual Capital field there has been more focus in the area of determining the commercial drivers for implementing KM and Learning (Lev, 2001), (Marr and Schiuma, 2001), (Marr et al, 2003), (Kaplan and Norton, 2004).

2.1 Links between KM and learning

Cavaleri (2004) traced the philosophical roots of KM and Learning and concluded that they both had common ground in the area of pragmatism. From this, he proposed a more pragmatic version of KM to provide better alignment of the two concepts, which is based on a shared purpose of facilitating effective action. He states that although learning is based on social enquiry that is focussed on improving how previous experience is used, there is an underlying assumption that 'knowledge is an inevitable product of learning activities'. He then goes on to point out that the term 'knowledge' is rarely included in definitions of learning. This is surprising as one of the pioneers in the OL field, Argyris (1993), does refer to the link between knowledge and learning. Argyris (1993) goes on to refer to the detection and correction of errors and causal claims contained in knowledge. Cavaleri (2004) then goes on to refer to the concept of knowledge claims which aim to improve the effectiveness of processes. He introduces the action learning cycle (Kolb et al, 1979) which are at the core of OL practices and then refers to the following statement 'In pragmatist philosophy,

especially the Peircean version, learning, knowledge can never be separated from each other'. He concludes that when viewed in this way there are strong links and that further research is needed to look at how the two can be integrated.

Further studies include Scarborough and Swan (2001) who examined the literature of KM and LO and concluded that one does not learn from the other and that the distribution of references to KM and LO appeared to follow the fashion model developed by Abrahamson. The links between KM and LO were also explored by Chinowsky & Carrillo (2007), who proposed a bridging framework between two complimentary maturity models to link the two approaches. Pemberton & Stonehouse, (2000) examined a core competency based approach to linking KM and LO.

These studies demonstrate the clear links between knowledge management and learning which are exploited in this study by using a common approach to measurement of the benefits of both.

2.2 Common barriers

In terms of barriers an EFQM based study (EFQM/APQC/IBC/KMN, 1997) found the following; rewards structures; organisational structure; different cultures; internal competition; 'knowledge is power'; seen as separate from daily activity; and high existing workloads. A wide ranging study by McCann and Buckner (2004), covering 222 organizations in ten industries, identified two groups of barriers, conceptual and cultural, that prevent KM initiatives delivering to their full potential. These results reinforced earlier studies that concluded that culture is a major barrier (Mason and Pauleen, 2003), (De Long and Fahey, 2000).

In the construction sector, which covers the case study organisation, there are a number of studies which included examination of the barriers to the implementation of KM and Learning. A study by Carrillo et al (2004) reported the following; lack of standard work processes; not enough time, organizational culture; lack of finance, employee resistance, poor IT infrastructure. A more recent project (Chinowsky & Carrillo, 2007) added; poor business case/financial benefits; lack of focus; and an unstable workforce.

The similarity of the barriers to KM and learning provide an opportunity to use a common approach through measurement to overcome those related to management and staff buy-in.

2.3 Intellectual capital measurement

Over the last twenty years, measurement of Intangible Assets has developed into the discipline of Intellectual Capital (IC). In a special issue of the Journal of Intellectual Capital in 2004, leading members of the IC community debated the future of Intellectual Capital as a field of study. The various methods were reviewed (Andriessen, 2004), (Pike and Roos, 2004) with the aim of assisting the 'consolidation' phase that the community is perceived by some to be in. A paper by Andriessen (2004) explored the reasons for measuring IC and the methods of doing so. It also explored the distinction between valuation and measurement. The paper concludes that, due to the inconsistencies between the various approaches, this means that there is little focus on the actual problems that IC measurement could be applied to and also that clarification of valuation versus measurement will assist in identifying how and where they can be best used.

This topic was also covered in an earlier work by Marr et al (2003), which identified five main drivers for measuring intellectual capital; strategy formulation, strategy assessment and execution, strategy development, diversification and expansion, compensation, communication to external stakeholders.

Another paper by Pike and Roos (2004) assessed the current methodologies against standard measurement theory, with the aim of providing an approach that would result in having a similar rigour and transparency as traditional financial reporting. The methodologies covered fell into four established categories:

- Direct Intellectual Capital (DIC) methods
- Market Capitalisation Methods (MCM)
- Return on Assets (ROA) methods
- Scorecard (SC) methods

Examples of each method and their leading exponents were given. These were then evaluated against the five proposed conditions derived from measurement theory; completeness; distinctness; independence; agreeability; and commensurability. The study concluded that although no single method was compliant, there was sufficient coverage of each of the criteria to enable a single methodology to be developed.

Dealing with the issues surrounding the measurement, a leading researcher in the field of Intellectual Capital gave a keynote address to the Intellectual Capital Congress (Sveiby, 2004) entitled “Learn to measure to Learn”. Some of the key concepts were that it is not possible to measure social phenomena accurately. It is fragile and open to manipulation. Also, Measurement adds value only if the limitations are taken into account. Establishing the purpose of measuring intangibles is a key issue. He outlined six principles which aim to assist people to change their behaviours as a consequence of learning from any measurement system: bottom up development of metrics; use to improve own processes and report as raw data for accountants reports; open book reporting; use differences between units to start ‘a dialogue to discover hidden value’ not to apportion blame; make double-loop learning part of the process; no link to reward. In conclusion, he stated that establishing purpose of measuring intangibles is crucial. The measuring process should be regarded as an ‘invitation to a learning dialogue’. It also requires evolved leadership which both allows and demands people have ‘knowledge of the whole’.

The research into IC methods reveals that although these deal with high level whole business measurement, there needs to be proper account taken of the frailties of doing so and the resulting unintended consequences. The purpose and need for measurement should be clearly defined at the outset.

2.4 Competency based approaches

There are a number of studies covering competency based approaches to KM and learning (Sanchez and Heene, 1997), (Pemberton and Stonehouse, 2000) which can be linked back to the original work on knowledge creation by Nonaka and Takeuchi (1995). These studies use the concept of core competency development which may be adapted to measure the increase in value of individuals through knowledge and learning based on Milost (2007).

He proposed an evaluation model for use in empirical research into the value of individual and ‘groups of employees’. The model calculates the value of employees in a similar

manner to the accounting treatment of tangible fixed assets. The calculation was stated in terms of the value of employees in terms of 'purchase value', 'value adjustment' (depreciation over useful life) and 'net carrying amount' as used in the calculation of the value of fixed assets. The proposed model is described as 'dynamic' and its current status as in the phase of 'practical evaluation'.

The most interesting aspect of this work from the perspective of the researcher in the case study organisation is in the breakdown of the 'purchase value' of employees. He separated this into three aspects; investments in employee training; investments in employee acquisition and employee opportunity costs which can all be given a value. The proposals around the 'useful life' of an employee and 'value adjustments' seem less certain and as a result their validity is open to question. The 'group of employees' evaluation proposals appear even more uncertain as they relate to the 'success' of the company in question. It uses a value added definition based on 'increased market value of business effects less the purchase value of necessary elements' and it is calculated as the sales value of the business effects less the purchase value of necessary elements.

Approaches to measurement based on competency may be more readily applied to knowledge intensive organisations which gain revenue from consultancy type services rather than the sale of actual products.

2.5 The need for empirical research

In their paper Marr et al (2003) called for more empirical research to test out the theories and drivers for intellectual capital measurement identified in the study and previously mentioned above. Three of the key drivers identified were related to strategy and discussed the use of strategy maps. However, the research revealed that the causal links between the measures and the initiatives implemented to bring about change have rarely been empirically proved. In the editorial for a special issue of the Journal of Intellectual Capital (Marr and Chatzel, 2004) a multi-disciplinary approach to rich longitudinal case studies covering the subject was endorsed.

The common theme from the literature is that due to the abstract nature of knowledge and learning, there is a need for more empirical research to ground the various theories through measurement of benefits.

3. Methods

The methodology used in the case study is action research based on the researcher's interaction with the company in his role as team leader of an internal improvement team which employs a consultancy-based engagement approach. Pilots are employed to establish the impact of the KM and learning tools and approaches through measurement and benefits capture. This aligns closely with the comments of Marr and Chatzel (2004) encouraging this type of approach to the study of the measurement of KM and Learning.

4. Case Study Outline

4.1 Background

The case study company is experiencing rapid growth due to a key change in corporate strategy, implemented in 2003, aimed at annual growth in the order of 20% based on turnover. A 'bottom line' culture exists which is historical and also due to the accompanying drive to improve margins. In a FTSE 350 company the polarisation towards

bottom line focus is a requisite and this research is aligned to this with the aim of making it easier to achieve targets. There is also a move towards greater market integration in terms of expanding existing white collar service into new markets and blue collar services as a new activity in an existing market. Similarly, there are further opportunities to extend the recently acquired Local Government Business Process Outsourcing (BPO) capability into Central Government and IT Services offerings. This growth through acquisition means there is an imperative for the company to maximise the knowledge and learning of both its existing and newly acquired staff.

In terms of intangibles measurement the impact on the market to book value (MBV) calculation (Lev 2001, p8), since the original merger in September 2003 that launched the strategy, has been to maintain the MBV value around 4. This means for every pound of tangible assets there are three pounds of intangible assets, or the difference between book value and market value is 75%. This compares with the Ericsson Business Consulting figure of 80% (Lovingsson et al 2000). In the period 1980 – 2001 Lev quoted the market-to-book value figure for the Standard & Poor 500 companies peaking at a value of 6 (Lev 2001, p8). In their book on strategy maps Kaplan and Norton (2004 p5) gave a figure of over 75%.

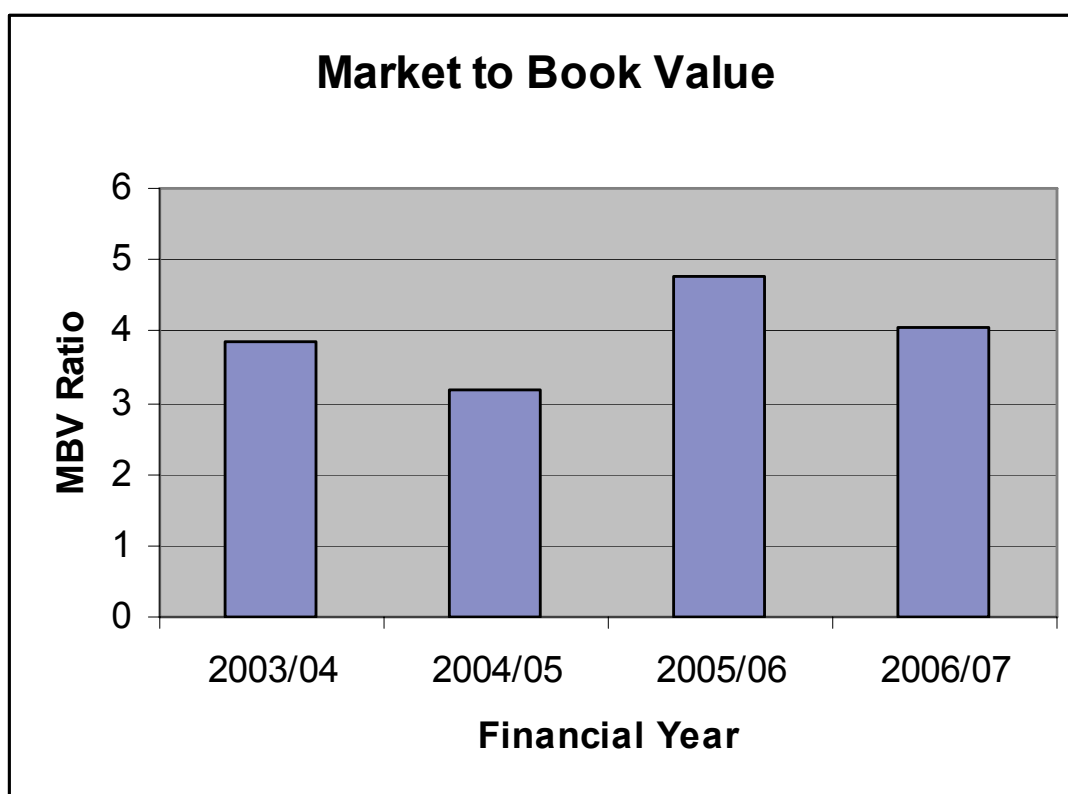


Figure 1: Market to book value for the case study company

This ratio is important as it demonstrates the need for maintaining the value of the case study company's intangible assets whilst pursuing its acquisition based growth strategy. The business needs to successfully leverage the people assets it acquires which is a key challenge for knowledge intensive firms. The ratio demonstrates a key reason (or driver) Marr (2003) for attempting to measure intellectual capital. In terms of the case study organisation it will be used to demonstrate the latent or unrecognised potential for

improving the value of the company's intellectual assets through learning and knowledge management.

The basis of the study was to develop a common approach to measurement that did not differentiate between Knowledge Management and Learning. This simplifies the explanation of the concepts being presented to the actors involved. Pilots were set up to demonstrate the feasibility and effectiveness of several measurement approaches for a number of high profile live projects. These were then used to gain the buy-in of the various stakeholders. The results will also be used as part of the inputs to a Business Maturity Measurement tool being developed to assess the overall capability of the Business Stream.

In terms of testing the various approaches to measure benefits a number of pilots have been identified to demonstrate how KM and learning benefits can be identified, quantified (if feasible) and disseminated across the business.

4.2 Approach 1 - Engagement framework

This approach was selected to demonstrate value added by the researchers' team and to pilot through project lifecycle learning measurement. It is designed to gain commitment to improvement projects and review their progress. The process is being used to pilot the capture of benefits during the lifecycle of a project and consists of three phases.

Phase one during project set-up where potential areas of benefit are identified. Phase two during project delivery where key learning points and benefits are captured at pre-determined review meetings. Phase three at the end of the project when a summary of benefits, both quantitative and qualitative, and key lessons learnt are documented and transferred to a simple database. A value curve is produced as an exemplar of measuring client perception of delivery quality and reflection of the team members own performance through the project lifecycle.

The document itself becomes the means of capturing the learning and associated benefits on an empirical basis. This information can then be extracted into a database of benefits both quantitative and qualitative. Aggregation of any financial benefits will be carried out on an ongoing basis and a report generated annually.

4.3 Approach 2 – Team learning cycle

In this case the approach is used to demonstrate how the complex concepts can be made more acceptable by adapting a well known improvement model to gain acceptance of new techniques with the actors. It uses the researcher's team as an exemplar in the creation of a learning cycle approach to measurement of learning through an event based approach. This utilizes the traditional assurance based audit process linked to an adaptation of the Plan-Do-Check-Act cycle spread across an annual quarterly cycle of events designed to propagate double loop learning (Argyris and Schön, 1978 p3), duetero learning (Argyris and Schön, 1978 p27) and best practice/benefits capture.

A series of reviews of audit findings and trends are held on a quarterly basis and using a progressively larger number of actors, each of the events through a Plan-Do-Improve-Learn cycle that is linked to the business planning cycle. Through the cycle an increasing number of actors from a wider pool of departments are progressively involved to share and generate the knowledge and learning gained.

Capture and dissemination of knowledge, learning and benefits are enabled through use of KM based tools and methods. In this case through the use of a simple database and retrieval system using a 'yellow pages' based approach to provide a directory of benefits i.e. cost savings, lessons learnt, best practice.

4.4 Approach 3 – Project learning cycle

This approach addresses the issue of making the capture of knowledge and learning along with benefits part of normal project working. It is designed to enable project based generative learning through creation of a learning cycle approach to measurement of learning through a series of events designed to propagate duetero learning (Argyris and Schön, 1978 p27). This is again linked to the Plan-Do-Improve-Learn cycle. In this case the frequency of the reviews is based on the specific nature and requirements of the project. Capture and dissemination of knowledge and learning is as described in Approach 2 (4.3 above). The process provides a user friendly interface to encourage take up of best practice and aid selection of techniques to improve projects and processes throughout the project lifecycle.

4.5 Current status

The project is currently at a stage where the initial pilots to test out the approaches and related theories have been set up. The current methods of measurement for the above are based on capture of best practice and, where feasible conversion of process time reductions into financial savings. Process time reduction estimates for the time taken to carry out knowledge intensive tasks are used to build up the financial savings generated from implementing KM and learning. These are based on empirical observation to ensure that the causal links are identified.

5. Analysis and Discussion

The research differs from many Intellectual Capital methods by taking a simplistic, highly pragmatic approach based on empirical measurement at the individual project level.

In attempting to implement KM and Learning the case study organisation's management need to be convinced of the real worth of what are perceived by many in industry as abstract theoretical concepts. Demonstration of identifiable benefits, both quantitative and qualitative, is considered a prerequisite to obtain a viable mandate for change. This opens up the possibility of exploiting the concept of a knowledge-to-cash cycle which can be considered an extension of the more usual cash-to-quote cycle. The latter is often used to focus the identification of savings in many IT led business transformation projects.

The following table below shows how the various approaches relate to the tools, measures and barriers to the implementation of KM and learning.

Table 1: How measurement addresses common barriers to KM and learning

Approach	Tools	Measures	Barriers Addressed
1. Engagement Framework	Simple database with 'yellow pages' user interface	Best practice examples Process time savings Value curve	Management buy-in, Lack of business case Learning Employee resistance Being seen as separate from daily activity
2. Team Learning cycle	Adapted Plan-Do-Check-Act cycle Simple database with 'yellow pages' user interface	Best practice examples Process time savings	Understanding complex concepts Bottom line focus Employee resistance Being seen as separate from daily activity
3. Project learning cycle	Adapted Plan-Do-Check-Act cycle Simple database with 'yellow pages' user interface	Best practice examples Process time savings	Understanding complex concepts Bottom line focus Challenging the status quo Being seen as separate from daily activity

There is also a need to transfer emphasis away from bottom line thinking towards systems thinking. Identification of benefits is difficult. All these are related to culture change away from a purely financially driven bottom line focus and a move towards a financial return benefits focus. Justification through measurement is used to overcome the barrier of buy-in.

Further areas of research planned include the examination of the use of a competency based approach to measuring improvements in the knowledge and learning of individuals which can be aggregated to assess improvements across businesses as a whole. As discussed in section 4.5 above there is an opportunity to link this work to the core competence based approach to knowledge and learning outlined by Pemberton & Stonehouse (2000). It should be possible by adapting the approach outlined by Milost (2007) to measure the increase in core competencies resulting from knowledge creation activity by the increase in employee's open market value as they move through a competency-based grade structure.

Another area to be addressed is assessing the impact of the research on the bottom line culture and whether this approach can change the views of the actors at both the executive and the more junior reporting levels.

Conclusion

The research demonstrates that activities such as engagement frameworks and event based approaches can be used to capture knowledge and learning for re-use. These can be used to enable the knowledge management and learning processes being implemented by overcoming barriers to their acceptance. They can also be used to capture and demonstrate empirically the benefits of implementing KM and Learning tools and techniques into an organisation.

The study has also demonstrated how the body of research may be grounded through a longitudinal case study designed to bring about improved praxis. However, persuading an organisation to think in these new ways is a complex and difficult task.

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APPENDIX C – PAPER 3

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OVERCOMING CHALLENGES IN APPLYING LEARNING THEORY TO PROJECTS THROUGH LEARNING *PRAXIS*

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ABSTRACT

Learning lessons from projects and measurement of the resulting benefits from applying what is learnt are not well covered in the literature or developed in practice. This paper reports on a longitudinal case study in the support services sector focusing on how *praxis* can act as a key enabler in achieving successful outcomes in this field. The research is practice driven and develops a methodology for improving lessons learnt capture, implementation and measurement of resulting benefits. It extends the application of existing theory in the fields of knowledge management and organizational learning. A series of workshop events were held which revealed that the emphasis should be on demonstration of the efficacy of the approach to achieve the key objectives of capturing lessons and encouraging benefits measurement rather than understanding the complex and often abstract theories involved. The events, based on ‘open space’ facilitation, create a ‘*ba*’ environment which encourages the creation of knowledge (Nonaka *et al*, 2000). Measurement of benefits is enabled through the production of ‘benefits realization cards’ which make the learning more explicit and therefore more easily quantifiable. The methodology is based on creating a continuous cycle of learning events at the end of each phase of a project rather than a single event at the end. This *praxis* based approach is designed to overcome some of the traditional barriers to effective lessons learnt capture and actual implementation on projects. It allows the theories to be practically enabled by busy practitioners who would not have the time to engage with the relevant literature. The research addresses the issue of how we get research to have an impact in the business community i.e. how we bring quite abstract theory into very practical use. This paper provides a foundation for other researchers to further develop the approach for use in other contexts.

Keywords: Benefits, Lessons Learnt, Measurement, Praxis, Project Management

INTRODUCTION

Identifying lessons learnt from past projects and applying them to new projects is often problematic (Anbari *et al*, 2008; Julian, 2008; Scarbrough *et al*, 2004; von Zeditz, 2002;) particularly in the construction sector (Carrillo, 2005; Carrillo *et al*, 2004; Chinowsky and Carrillo, 2007; Jashapara, 2003). The theories that explain how knowledge is created and learning occurs in a business environment are complex and often highly abstract making them difficult to apply in practice. (Argyris and Schön, 1978; Nonaka and Takeuchi, 1995; Wenger, 2000).

In the study covered by this paper the research is being conducted in the Highways division of a leading support services organization with clients predominantly in the public sector. The delivery process is typically project-based with durations ranging from weeks to years. This paper reports on a longitudinal case study in the support services sector focusing on how praxis can act as a key enabler in achieving successful outcomes in this field.

The research examines how theories from the fields of knowledge management and learning can be used to develop a new methodology to improve project lessons learnt and explain how the challenges were overcome. The paper commences with a brief outline of the literature covering the relevant theories and concepts used in the development of the approach. Sections follow which then outline the research methodology, describe the case study activity, reports on the results and key findings that are emerging. The next section discusses the results/findings and how they address the two key research questions. Can a praxis based approach be shown to improve projects lessons learnt processes. Secondly, can it provide focus for the measurement of benefits. The final section makes recommendations for areas of further research to fill in the gaps arising from the study covered by this paper.

REVIEW OF LITERATURE

The main research fields related to this investigation into project learning are Organizational Learning (Argyris & Schön, 1978), Learning Organizations (Pedler, 1995) and Knowledge Management (Nonaka and Takeuchi, 1995). This section provides a brief outline of the literature in these fields and related fields that is most relevant to this particular study.

Key concepts

Duetero learning is a key element of organizational learning theory developed by Argyris & Schön (1978). It can be defined as the process of learning from past experiences of learning from which the barriers to learning can be identified and shared with others. Strategies for overcoming these impediments can be identified which can then be implemented across an organization to create a learning organization.

Boundary objects emerged from the work of Wenger in his research covering Communities of Practice and their role as social learning systems. As part of this study he introduced the concept of boundary objects which he described as taking 'multiple forms' e.g. artifacts in the form of tools, documents or models; discourses using common language to communicate and negotiate meaning across boundaries; and, shared processes, including explicit routines and procedures that allow people to coordinate their actions across boundaries. (Wenger, 2000 p. 236)

The concept of the learning spiral of knowledge creation was developed by Nonaka and Takeuchi (1995) as part of their study on the topic of Knowledge Management. They used the cultural differences between the Eastern and Western societies as the basis for their examination. In the course of their research they developed a series of models to explain the complex topic of how knowledge is created.

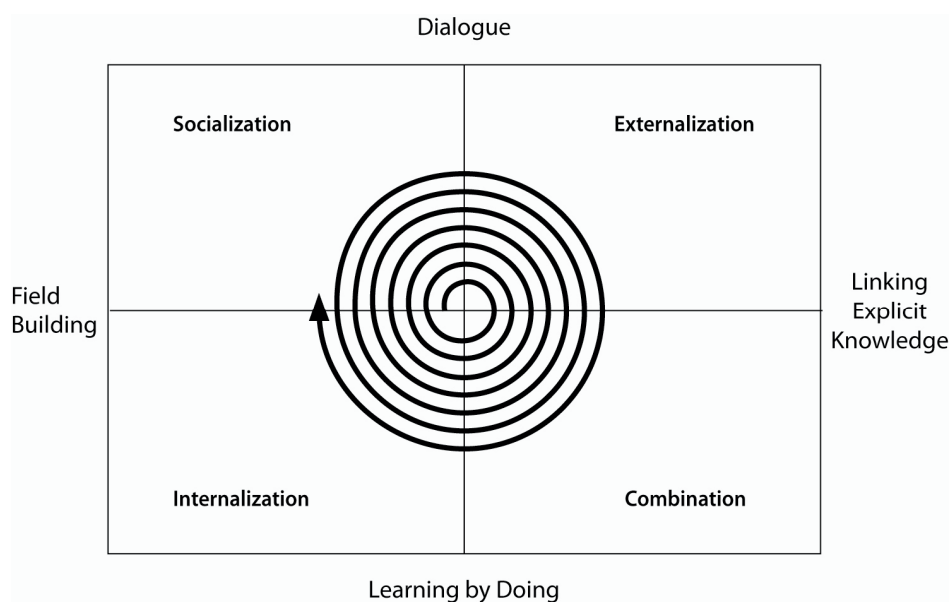


Figure 1. Knowledge spiral (cf. Nonaka and Takeuchi, (1995 p.71)

This consists of four modes of knowledge creation i.e. socialization, externalization, combination and internalization. The first mode builds a “field” of interaction where the actors share experiences and mental models. The second mode is an externalization process where dialogue and/or collective reflection help the actors to articulate their tacit knowledge which is normally hidden and difficult to make known to others. The third mode of combination is triggered by “networking” newly created knowledge with existing knowledge. The final mode, internalization, is triggered by “learning by doing”

The concept was further developed by Nonaka *et al* (2000) to include the concept of ‘*ba*’ which they defined as;

‘... a shared context in which knowledge is shared, created and utilized. In knowledge creation, generation and regeneration of ‘*ba*’ is the key, as ‘*ba*’ provides the energy, quality and place to perform the individual conversions and move along the knowledge spiral.’

Facilitation

In terms of creating the right environment the open space technology concept developed by Owen (2008) is of relevance. This promotes ‘self-organizing’ events where the participants decide on the number of sessions, the topics for discussion, speakers, timescales and even ‘vote’ which events they attend and for how long using the ‘law of two feet’. By the end of the event the following has occurred; every issue of concern has been tabled; all issues were discussed to the extent agreed by the participants; a written account of discussions is produced and circulated to participants; issue are prioritized in order; any critical issues are identified and actions to deal with them agreed.

Barriers

There have been a number of relevant studies which have covered the barriers to implementing change through knowledge management and learning in project-based organizations (Bresnen et al 2005; Carrillo 2005; Cavaleri, 2004). Project teams are reliant on the expertise of their team members and their knowledge is built up over a number of years where they learn the lessons from each project and build up an individual tacit knowledge base (Julian, 2008). There are a number of challenges to making this knowledge explicit to a wider audience. One aspect is how to deal with teams whose membership changes from one project to another and can even change between individual phases of a project (Chinowsky & Carrillo, 2007). This is mirrored by the external supply chain partners and clients which makes creating the time for lessons learnt capture difficult, particularly if it is in the form of a post project review (Anbari et al, 2008; Carrillo, 2005; Julian, 2008; Schindler and Eppler, 2003).

A study by Keegan and Turner (2001), which was based on interviews across 19 companies, concluded that a common barrier to learning in projects was time pressure due to conflicting business priorities. Sense (2007) revealed that the lack of the right sociological environment taking into account the following; cognitive styles of learning; interpersonal relationships; authority levels; knowledge management processes; project learning environment.

Case study based research in the construction sector by Scarbrough *et al.* (2004) developed the concept that 'learning boundaries' assist in understanding the 'divisions of practice' and resulting tensions between learning in projects and the practices that need to be changed in 'parent' organizations. This can affect the buy-in of both middle and senior management. von Zeditz (2002) found in an R & D context that post project reviews need to be part of wider organizational learning and therefore require the buy-in of top management.

Practice

Caveleri (2004) in a paper examining the links between KM and Learning suggested that organizational learning and KM have the same purpose of facilitating effective action. He advocated that a more pragmatic approach to their implementation by 'grounding knowledge in practice' and noted that they share in common 'action learning cycles', knowledge (or causal) claims and a concentration on effective action.

Gheradi (2009) suggests that in the context of critical Practice Based Studies (PBS) there is a 'knowledge interest' in working environments in researching how actors 'do what they do' and 'what doing does'

METHODOLOGY & CASE OUTLINE

The methodological approach to this research takes the form of an action research based longitudinal case study which is being used to improve learning in project-based organizational context. It depends generally on qualitative methods i.e. direct observation, participation, targeted individual interviews and direct intervention in the form of delivering workshops. There is also limited quantitative evidence from surveys of participants in the workshops. One of the key features of action research is that the theory is "grounded in action" (Eden and Huxham, 1996) which establishes the validity of the research. In this case a *praxis* based approach is being developed which aligns with these principles by using action

in the form of events where the participants are facilitated by the researcher to enact the theories being applied.

The methodology has been designed to create a learning to learn culture and allows the participants to ‘experience’ the key theories involved i.e. duetero learning, SECI spiral of knowledge creation,. The workshop agenda is designed to be flexible so that it can be adapted to the objectives of each workshop. The process which is facilitated by the researcher and others has five basic elements or steps; Pre-work; Looking Back; Prioritization; Looking Forward; Publication. The main principle is that by the end of the event an electronic version of the outputs will be available for review at the final session of the event for the participants to share and review. A target number of benefits realization cards is set for each event based on the number of participants.

Case study outline

The case study organization is a fast growing knowledge intensive professional services organization. The performance and the quality of the service provided and the sustained competitiveness of the business are largely down to how effectively promises can be delivered and challenges met. One of the key enablers for this is the ability to learn from existing activities and apply the learning to continually improve and innovate whilst delivering a quality service to clients. The division being studied is the Highways part of the business which has approximately 3,500 employees delivering roads design, maintenance and technology services to local authority and central government transport departments. The operations are spread over 80 locations across the UK and Eire with many contracts based at client premises and co-located with their teams. The researcher has held several roles during this study based within the division’s own internal improvement department.

The methodology was developed through a number of different pilot activities. This paper covers three events that were aimed at improving project learning. The main vehicle for this was the roll-out of an enterprise resource planning (ERP) IT-based business wide system. The overall context is the improvement of the delivery of support services in public sector infrastructure in a project-based environment. Learning to improve the approach being developed from other pilots will be referred to in this study where applicable.

The overall aims and objectives for the three ERP roll-out events were as follows:

1. Aims: To improve lessons learnt capture and benefits realization in a large scale roll-out project
2. Key objectives: To provide a means of capturing lessons learnt in a structured manner, improve take-up (implementation) and promote benefits measurement

The event is time constrained to four hours maximum, there is not set room layout and the outputs are captured in the form of benefits realization cards which along with workshops act as ‘boundary objects’. The basic workshop agenda has the following elements: pre-work; welcome and introductions; outline of the event process (and what is expected of people present); looking back to identify improvements through brainstorming in groups; ‘open space’ review; prioritizing using a four way matrix covering impact vs. of implementation; impact analysis using a grid; populating benefits realization card sections covering current vs. future state and benefits measurement with a target range; ‘open space’ review; re-distribution of the prioritized improvement areas to revised groups to suit the topics; looking forward in

terms of populating implementation planning sections of the benefits realization cards i.e. critical dependencies; risk/issues and mitigation; resources/actions/review intervals; timescale; owner; key contact(s) information for the topic area; 'open space' review after completion of each card.

There are a number of aspects that need clarification. Firstly, there is deliberately no reference to any theory during the event. This was a result of reflection by the researcher and the resultant learning from an earlier pilot where the explanation of the learning theory was given to the actors. In that instance the actors struggled to see the relevance to their work or improving their practice which acted as an immediate barrier to acceptance of change. Secondly, the 'open space' reviews are designed to create a 'ba' space that allowed the actors the time for personal reflective and progress either independently or as part of a group through the SECI modes and enable progression along the knowledge spiral (Nonaka and Takeuchi, 1995; Nonaka *et al*, 2000). The 'open space' review process uses some of the concepts of open space technology developed by Owen (2008) i.e. all ideas are tabled through brainstorming, all issues are reviewed, benefits realization cards capture the outputs from the event and are circulated on the day.

The three events covered in the following analysis were held over a six month period during the first two implementation phases of the business wide ERP roll-out project which has an overall duration of two years. A standard target of three benefits realization cards per syndicate was set for event.

The first event focused on lessons learnt from the implementation of the first phase of the roll-out and followed the basic agenda. The pre-work requested attendees to identify three examples of what went well and three examples of what went not so well. It was attended by eleven project team members plus an additional facilitator. Two team members also acted as facilitators the researcher (Subject Matter Expert - SME Highways) and the Change Manager and two of the remaining seven attendees acted as event recorders for their groups. A variety of project roles were represented covering both case study company members and staff from the implementation Consultancy firm.

The second event focused on measurable benefits that would arise in the business from the ERP roll-out rather than lessons learnt. A revised agenda was used which focused on looking at the impact of measurable benefits going forward but still retained all the process elements in the basic agenda. The pre-work requested attendees to identify five examples of areas of benefit and in addition the outputs from the first event were circulated. It was attended by 9 project team members plus an additional facilitator. One team member also acted as a facilitator the researcher (Subject Matter Expert - SME Highways) and two of the remaining eight attendees acted as event recorders for their groups. A variety of project roles were represented covering both case study company members and staff from the implementation Consultancy firm.

The third event focused on benefits realization from the ERP roll-out for a specific business division. The agenda was the same as the second pilot. The pre-work again requested attendees to identify five examples of areas of benefit, its likely value and how it could be measured. It was attended by eight business representatives. A variety of senior management roles were represented. The researcher and the Change Manager acted as facilitators.

RESULTS & ANALYSIS

The events were used to develop the process over a period of time and through direct observation and reflective analysis the researcher was able to identify the theories which contributed to the success of the events. The events and the facilitation process create in effect a 'ba' space which enables participants to traverse the Nonaka *et al.* (2000) knowledge creation spiral by creating opportunities for them to experience the four modes of socialization, externalization, combination and internalization.

The first step of pre-work allowed the time for reflection on what happened on the project i.e. internalization in preparation for externalization at the event. The second step, looking back, uses brainstorming techniques that allow for socialization amongst the syndicate team members and externalization of ideas using post-its on flipcharts. The open space reviews allow further time for self-reflection aiding internalization, also externalization through dialogue with others. The third step involves a prioritization exercise which is highly interactive and allows the actors to vote on their top three preferences. This again aids externalization and internalization. The population of the benefits realization cards acts a form of combination. The fourth stage of looking forward uses a different mix of team members and this further aids socialization. The concentration in this step on the completion of the cards allows collective reflection and promotes combination and the start of internalization. The final step covers publication and dissemination which allows the knowledge created to cross the boundary of both the event and the project. This aids further combination and internalization.

The first event, which covered project lessons learnt, generated four completed and two partially completed benefits realization cards. These covered the following areas for improvement; programme roles and responsibilities; leadership; common processes; and, project management.

The second event, which focused on measurable benefits across the business, generated four completed benefits realization cards. These covered the following areas for improvement; procurement; integrated operations; resource planning; and, billing.

The third event, which focused on measurable benefits for a specific business division, generated six completed benefits realization cards. These covered the following areas for improvement; procurement strategy; operational purchasing; process control: resource planning; and, financial processes.

The target for number of benefits realization cards to be produced was only met in the third workshop. This was due to a number of factors; the maturity of the process; the increased subject knowledge of the actors; greater ownership of outcomes.

The following challenges were identified through the direct observation and reflective practice of the researcher during the course of the case study.

Challenge	How it was addressed	Contributing Theory/Concept
Obtaining the 'buy-in' of management in particular and other actors/stakeholders	Pre-work & initial briefing to management on the process and expected outcomes and financial benefits Time-boxed approach Cyclical process for large scale multi-phase projects Highly flexible Dynamic and interactive Voting process Consensus prioritization Emphasis on quantifiable benefits	Duetero learning Argyris & Schön (1978)
Understanding complex/abstract theories	Event-based presentation of theory. The participants are closely facilitated in such a way that they act out the theories/concepts themselves. i.e. they learn how to learn through participation in more than one event.	Action research – Eden and Huxham (1996) Duetero learning – Argyris & Schön (1978)
Creation of the right environmental conditions (time & space) for learning	Workshop process in particular use of open space techniques Multiple facilitators Use of event recorders to capture outputs as they are produced Phase based approach	'Ba' space – Nonaka <i>et al</i> (2000) Reflective practice – Argyris & Schön (1978) Duetero learning – Argyris & Schön (1978)
How to apply the learning successfully	Benefits realization cards – capture thinking and communicate it outside the event Use 'buy-in' of management at early stages	Boundary objects – Wenger (2000) Action research - Eden and Huxley (1996)
Improving measurement of benefits	Focus on measurement of benefits early both size and actual methods of measurement/monitoring Identify links to corporate objectives	Boundary objects – Wenger (2000)
Sharing of lessons and outcomes	Rapid dissemination – make it newsworthy Accessible through use of an 'eBook' as a repository	Boundary objects – Wenger (2000)

Table 1 Relationship between theory and overcoming challenges

The empirical basis used for the development of the methodology allowed the approach to use a variety of concepts, techniques, tools and theories rather than adopting a narrow approach linked to one particular field of research. This helped to overcome a number of the barriers to project-based learning that exist. It has allowed the researcher, through using relevant theories to understand what has happened, to act as a reflective practitioner and develop a

methodology to improve project-based learning based on *praxis*. It has brought learning theory into practice by seeking to incorporate it into project lifecycle processes.

CONCLUSIONS

This study has been a practice driven approach aimed at; changing the practice of capturing lessons learnt in a project context; improving the take up and implementation of project-based learning; providing focus for the measurement of the resulting outcomes.

The desired overall impact is greater ownership by the participants and increased sponsorship from management through the emphasis on benefits realization. It extends the application of existing theory in the fields of KM and Organisational Learning in project-based contexts. This is achieved by explaining these theories in a way that practitioners can understand by causing them to be enacted in practice i.e. through *praxis*. The approach has demonstrated through action research how a methodology for the application of abstract and complex theory to project-based learning has been developed.

Implications

The approach can be used to change the way project lessons are viewed, valued and operate in practice. This work also provides a foundation for developing this approach in a wide range of contexts. Particularly, where the use of events is a key element and there is a need to gain consensus, capture outputs and share understanding e.g. strategy development, business planning, team building, change management.

Limitations

The study has been based on a limited number of small scale pilots in a single organisation. The approach to measurement and ongoing monitoring has not been covered in practice. There is a need for a model to be developed which explains how the theory is applied in a simple manner. This will aid the understanding of others who might wish to adopt the approach or extend the research into other contexts.

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APPENDIX D - PAPER 4

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IMPROVING PROJECT LEARNING - A NEW APPROACH TO LESSONS LEARNT

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Abstract

Purpose – This paper reports on research which has developed a new approach to capturing project-based learning.

Design/methodology/approach – The research is based on action research as part of a longitudinal single organization case study.

Findings – Project learning processes can be improved by using an event-based approach to project knowledge integration that propagates duetero-learning. The approach developed generates outputs that codify lessons learnt and promotes measurement of benefits. The event and the outputs, in effect, take the form of “boundary objects” which act as a bridge or means of translation between the participants, as well as to those who will use the learning to improve their own project practice on other projects.

Research limitations/implications – The approach has only been applied within a single support services organization, but could provide a way of overcoming the considerable difficulties inherent in capturing lessons learned within project based environments.

Practical implications – The approach helps to overcome the key issues of obtaining management and staff buy-in, and dealing with the time pressures that exist in project-based environments. The outputs can be applied to encourage learning across projects and wider communities resulting in improved practice.

Originality/value – The process uses the concept of boundary objects to explain how some of the problems arising when complex abstract concepts are involved can be overcome, particularly in increasing understanding and buy-in from the actors involved. Viewing learning events as boundary objects sees them as mediating information across project boundaries, between project practitioners and across business units. The event process can be adapted for a variety of scenarios and used by an organization or group of organizations to improve and apply learning more successfully.

Key words: Action learning, Boundary objects, Organizational learning, Project learning

Paper type: Research paper

Introduction

In project-based organizations learning lessons from past projects and actually implementing the learning successfully on future projects is commonly acknowledged as difficult to achieve (Anbari *et al*, 2008; Carrillo, 2005; Julian, 2008; Newell and Edelman, 2008; Sense, 2007; Schindler and Eppler, 2003; von Zeditz, 2002). Some of the major factors inhibiting learning and the capture lessons learnt in a project context are the wide variety of actors involved, the dispersed geographical nature of large scale inter-site or global projects (Sapsed and Salter, 2004), and their temporary nature (Keegan and Turner, 2001). A key enabler for improving project delivery is the ability to learn from existing activities and use this learning to continually improve and innovate whilst delivering a quality service or product to clients (Carlile, 2004). Finding new, more appropriate ways to capture and embed learning emerging from projects is important, therefore, to developing mitigations for recurrent problems which can occur in such environments.

This paper describes empirical research into project learning in organizations with the aim of improving capture of lessons using a set of workshop based processes to generate more meaningful outputs. It proposes the use of boundary object concepts (Carlile, 2002; Star and Griesemer, 1989; Wenger, 2000) in terms of improving the capture, dissemination and application of learning from past project activity in large-scale multi-phase project environments. The approach has been developed in a single case study organization which provides support services to public sector and regulated industry sectors. These services are generally delivered on a project-by-project basis and include civil engineering, infrastructure management, business process outsourcing, project management and management consulting. The performance and the quality of the service provided and the competitiveness of the business are predicated on how effectively projects can be delivered and challenges met. In order to develop a new approach to capturing and re-using knowledge within this environment, a major UK-wide IT system roll-out project was used as the main vehicle. This was supplemented by running a further pilot workshop as part of a management development programme where the operational managers were engaged in the delivery of service improvement projects across the organization.

A key aim of the new approach is the propagation of continuous improvement via “duetero-learning” (Argyris and Schön, 1978: 27) with an emphasis on benefits realisation. This requires focussing not only on capturing the lessons but also on identifying the methods for measuring the outcomes. The research has developed an “event-based” approach to capturing lessons learnt aimed at improving their take-up and promoting the benefits of the outcomes. The events and their outputs are positioned within this paper as forms of boundary objects which connect the stakeholders taking part in the events.

Learning in project-based environments

The focus of the research is improving learning in project-based contexts and the research addresses the specific question “Are there better methods for capture and re-use of project lessons?”. In this section the relevant aspects of the literature are reviewed including organizational learning, project learning and boundary object concepts.

Two of the early researchers in the field of organizational learning were Argyris and Schön. They put forward the key concepts of single loop learning; double loop learning; theories-in-

use; and, espoused theory. Single loop learning is where errors are detected and corrected but the organization continues with their current policies and goals. Double loop learning occurs when error is detected and corrected in ways that involve the modification of an organization's norms, policies and objectives. Theories-in-use are the mental maps which guide interpersonal behaviour, the behavioural worlds we live in, our effectiveness and capacity for learning rather than the theories people explicitly espouse which are theories-of-action. (Argyris and Schön, 1974: 2-4). A further development was the concept of duetero-learning or when organizations' members learn from previous learning activity i.e. applying organizational learning concepts to the learning process itself. This leads to a focus on analysing reasons for successes and failures from which the barriers to learning can be identified.

In later research Argyris (1992) identified a conflict arising from the way in which individuals use their defensive reasoning processes. He found that what individuals said they believed i.e. their "espoused values" and what they really believed and did as a result i.e. their "theories in use" could be quite different. In practice, this could lead to unintended outcomes from applying these processes. Another challenge to propagating a learning culture is that many opportunities result from errors or failure with which practitioners do not wish to be associated. He also suggested that potentially embarrassing or threatening errors can become a key barrier to learning at all levels in organizations. These defensive routines (Argyris 1992) are also evident in the results of a study by von Zeditz (2002) who examined how post project reviews could be used as a tool for organizational learning in R & D settings. Interviews with twenty-seven R & D managers across a number of industries and countries which revealed that only one in five R&D projects were not reviewed after completion and of those that were few had established review guidelines. More importantly, in the case of projects that were abandoned, most were not reviewed for causes of failure.

This type of effect was also highlighted in research by Julian (2008) where he introduced the term "red-light learning" when "reflective practices become enculturated as a punitive experience, making it more likely that defensive routines will be perpetuated" (p.55). The overall basis of his research was the importance of Project Management Office (PMO) Leaders in facilitating lessons learnt across projects. This work looked at the failure to embed past project learning in new projects leading to the re-solving of problems again and again. The study was based on interviews with twenty PMO leaders from a variety of industries including finance, health, consumer goods, IT and consulting. Their responses were validated by a number of focus group sessions. Resulting from the subsequent analysis he presented three main conclusions. The first is that PMO leaders act as "knowledge brokers" who transfer learning back into the system by modifying procedures, structures and systems to embed the learning in new projects. The second is that using changes in organizational routines can embed lessons learned through improved methodologies. The third is that defensive routines (Argyris, 1992) can inhibit the learning from previous projects particularly if there is a blame culture leading to what was termed "red light" learning. Four recommendations were made in respect of PMO leaders. The first called for PMO leaders to act as knowledge brokers across multiple communities through a "network of relationships built on trust, professional development and mutual understanding". The second called for equal emphasis on good projects as well as poor projects. The third addressed the need for reflection on lessons over the whole project lifecycle not just at completion. The final recommendation recognised the need for an independent facilitator to create the right conditions for reflective activity by actors. In particular, this should assist in minimising the

adverse effects of defensive routines. The last three are particularly relevant to the approach developed in the current research being reported in this paper.

Further studies examined barriers to learning across organizational boundaries and between organizations. Scarbrough *et al* (2004) in their study of a utility and a construction firm investigated to what extent organizations can learn from projects. They suggested that although projects have the potential for generating learning, the application of the learning is dependent on the learning activities of the wider organization. In an investigation into project based learning practices in a number of European companies Keegan and Turner (2001) found that three of the key barriers to learning in project-based firms are time pressures, centralization and deferral. Although they found increasing numbers of initiatives to try to overcome these issues the quality of the practice was poor and there was not enough time available for project teams to reflect on their experiences. Bresnen and Marshall (2000) studied nine medium to large construction projects in terms of the relationship between partnering strategy, organizational learning and knowledge management. They identified difficulty in the capture of project knowledge as a key barrier to learning how to cooperate.

This raises the important issue of learning across organizational boundaries both within and between organizations, which was explored in relation to the concept of boundary objects by Star and Griesemer (1989). They suggested that boundary objects provide a means of “translation” whereby the same knowledge and information is used by different actors who have diverse perspectives and views about the information being generated and how it should be used and interpreted. This perspective is explored in more detail later in this section.

The processes of project learning in terms of gathering or “harvesting” project knowledge were investigated by Schindler and Eppler (2003). They reviewed project learning methods in nine multi-national organizations in the industrial and service sectors. They identified a number of success factors which included regular capture at important milestones, use of a neutral moderator, collective interactive evaluation of lessons, use of graphics with outputs in a poster format, commitment to action with an outline of their implementation form and person with responsibility. These can then be used to both institutionalize and integrate lessons learnt activities into project management processes and phases in order to propagate continuous project learning. In a similar vein Sense (2007) examined the need to create the right environment for learning in projects as part of a larger change programme. A model was proposed consisting of five sociological elements covering cognitive styles, learning relationships, pyramid of authority, knowledge management and situational context. They proposed that using the framework practitioners “can structure a situated learning environment within their projects through communally analysing, critically reflecting upon and developing learning actions relating to the five sociological elements...” (p.407). They suggested that this will assist in individuals “learning how to learn”. The new approach developed by the research outlined in this paper takes into account some of these elements.

The links between knowledge management and project learning in the context of project review processes were investigated by Anbari *et al* (2008). They examined why post project reviews in the literature are generally believed to be beneficial but that in practice are not conducted in a consistent manner. They concluded that regular collection of lessons learnt in projects, their careful storage in the organizations historical information data base, and their meaningful utilization in subsequent projects are critical elements of project success and organizational competitiveness. They also proposed a number of areas for future study two of

which are most relevant to the research currently being undertaken. The first covered identifying “Who is best qualified to lead reviews the team leader or an expert at debriefing?” and the second covered investigating “What metrics or other empirical data can be employed to carry out cost-benefit analysis of post project reviews?” (p.642).

Measuring the benefits that may result from implementing organizational learning has not been covered comprehensively in the research literature. Case studies have been written but there is scant hard evidence in terms of quantifiable “bottom-line” benefits of implementing organizational learning. Overall there is a lack of empirical studies exploring this important topic (Jashapara, 2003; Lopez et al, 2005; Prieto and Revilla, 2006). Typically, key performance indicators have been used as the main method of measuring benefits of learning. This can lead to difficulties in establishing “cause” and “effect” and the exact impact of any changes that are made. This is particularly relevant where there are a number of different areas of improvement being implemented with multiple impacts across the business which may lead to some duplication of the effects. This can be addressed by using methods of measurement, with each individual area of improvement being recorded and the resulting savings aggregated to give an overall value of the benefits accruing from the improved project learning. These can then offer a transparent trail to enable particular interventions to be evaluated against their performative outcomes.

Boundary objects

The concept of boundary objects was first examined by Star and Griesemer (1989) in a study which investigated how the tensions arising from the different viewpoints of various groups of actors and the need for generalized findings can be addressed. In their case the Berkley’s Museum of Vertebrate Zoology was the organization studied. They observed that boundary objects are those objects which are: plastic enough to adapt to local needs and the constraints of the parties using them; robust enough to maintain a common identity across sites; weakly structured in common use; abstract or concrete; given different meanings in different worlds; commonly structured making them recognisable to actors in more than one world; capable of acting as a means of translation (c.f. Star and Griesemer, 1989).

Four types of boundary object were identified: repositories where objects are kept in an ordered manner for use by many types of actor; ideal types which take the form of generalized descriptions i.e. a drawing or similar that is deliberately vague to allow adaption for individual use; coincident boundaries which describe objects that have a common boundary but have different “internal” contents; standardized forms which are objects that allow common communication across different work groups (Star and Griesemer, 1989: 410). Their work is highly detailed and attempts to cover an abstract concept in a comprehensive manner. In doing so it provides a highly flexible definition of what constitutes a boundary object which allows it to be used in a virtually unlimited set of contexts. This “interpretive flexibility” (Trompette and Vinck, 2009) allows the concept to be used to inform the current study being undertaken in terms of the way it operates in the context of project lessons learnt.

The role of boundaries was also explored in an essay by Wenger (2000) on the notion of organizations being part of social learning systems and in particular the role of communities of practice. He described boundaries of (communities of) practice as usually being fluid and that “shared practice by its very nature creates boundaries”. He noted that they are important to learning systems as they connect communities and present opportunities to learn, as it is

here that competence and experience can become divergent with the optimum learning occurring when competence and learning are in “close tension”. He went on to cover boundary processes and three types of bridges that connect practice. He described these as people who act as “brokers”, artefacts that act as boundary objects (Star and Griesemer, 1989) and forms of interactions between people from differing communities of practice. On boundary objects themselves he stated that they can take multiple forms i.e. artefacts including tools, documentation, models, drawings; discourses of which common language is critical as it allows the communication and negotiating meaning across a boundary, and processes which are shared including procedures and routines. He also covered cross-disciplinary projects where “simultaneous participation in communities of practice and project teams creates learning loops that combine application with capability development” (p.237).

In terms of the use of artefacts the importance of visualization for reaching shared understanding was highlighted by Koskinen and Mäkinen (2009) and they suggested boundary objects as an example. Their study examined the role of boundary objects in the negotiation of project contracts. In the current research, visualization of the outputs being produced is used as a key element of the approach.

The extent to which organizations can learn from projects was examined by Scarbrough *et al* (2004). They used comparative analysis of construction projects in two case study organizations based on twenty-seven interviews. They found that in the case of projects the learning is “nested” whereby different learning levels may substitute for each other. They identified three dimensions of project-based learning: the practice-based nature of learning; the autonomy of projects; and the integration of knowledge. These have an impact at project boundaries which in turn limits the ability of the wider organization to learn from projects

The effectiveness of project management tools as boundary objects in geographically dispersed projects was investigated by Sapsed and Salter (2004). They interviewed thirty-three Program Managers working on a global program in a computing corporation. They concluded that boundary objects in the form of project management tools can be ineffective where there is little opportunity for face-to-face communication and there are ambiguous lines of authority. Where actors are unable to meet, the visual artefacts to share understanding and meaning are limited. Also when there is a lack of strong leadership avoidance of the use of tools can become prevalent. They concluded that due to their already marginal nature boundary objects can become isolated at boundaries and their effectiveness therefore limited.

A framework covering the management of knowledge across boundaries where innovation is required was proposed by Carlile (2004). In an automotive New Product Development setting requiring innovation he carried out an analysis of boundaries and the processes involved in managing knowledge across them. He proposed an integrative framework that linked three types of increasingly complex boundaries and processes (shown in brackets), syntactic (or information processing) involved with transferring of knowledge, semantic (or interpretative) involved with translating of knowledge, and pragmatic (or political) involving transformation of knowledge. The framework was used to highlight the practical and political issues that arise when innovation is required. This revealed that failures occur when actors do not have the same capacity or level of knowledge to manage novelty. In this way it is claimed that the model can be used to explore “boundary capabilities” and begin linking a firm’s organizational and strategic views. The work also attempted to provide insights into the

consequences of path dependency and power that are not addressed by purely knowledge-based views.

In a more critical review, as an introduction to a special issue, Trompette and Vinck (2009) revisited the notion mapping the use of the concept since its inception as part of an ethnographic study of the co-ordination mechanisms of scientific work. They commented how it has moved away from this original analytical use and is being used in ever widening areas including the knowledge management field. This has led, in their view, to the virtually autonomous use of the concept which they infer is due to some properties, in particular its “interpretive flexibility” which allows it to support “heterogeneous translations as a knowledge integration mechanism, as a mediation in the coordination process of experts and non-experts etc.” Other properties have “lost momentum” and others “disappeared” i.e. “invisible infrastructure” effect and “formative action of knowledge artifices”.

As outlined above there is increasing reference to the use of boundary object concepts to aid the understanding of the processes involved in capturing the knowledge of lessons and its transfer for use by others. However, there are few examples where the dynamics of the actual production of artefacts has been covered. This also applies to identifying measures for verifying the benefits of applying the lessons which renders them “learnt”. This is a key challenge that needs to be addressed in order to increase the buy-in of the actors to the process (Newell and Edelman, 2008).

The process outlined in this paper is designed to address some of these issues and is based on boundary object concepts. The approach developed is designed to be highly flexible or “plastic” enough to meet the needs of the various participating actors and can be adapted by changing the agenda, the pre-work element and the section headings in the benefits card. Although the event is of an abstract nature it does produce physical material in the form of the benefit cards used to capture the outputs of the events (see example in Table 1). These provide a common structure and act as a means of translation across the various worlds of the actors participating in the event and those who will subsequently use the outputs to implement the learning and measurement activity identified in the workshop event. (c.f. Star and Griesemer, 1989). The benefits cards and the workshop event form a boundary process as described by Carlile (2002) in his work in the area of new product development where “knowledge can be represented, learned and transformed” (p. 454).

In the context of this study, boundary objects would appear to offer a conceptual explanation of how learning can be translated in practice when employed in a learning event setting. Used in this way, such events can effectively be used to mediate information across key boundaries which exist amongst actors, in projects, across organizations and in supply chains. The remainder of the paper focuses on the development of a new approach to project-based learning which, in particular, addresses the key issue of the temporality of projects teams and the time pressures resulting in a lack of time to carry out lessons learnt activity effectively. Although the literature identifies these challenges there are few studies which set out to address the development of new practice-based methods necessary to overcome these.

Research Methods

This study has been based on action research using a longitudinal single organization case study to develop a new approach to project learning and the exploitation of lessons learnt in

more beneficial ways. The nature of the research and data sources available means that qualitative rather than quantitative methods are more suited to this type of research (Cresswell, 2009). In this case an event-based approach was developed by the researcher using a series of workshop pilots utilising, in a loose fashion, “open-space” elements (Owen, 2008) to generate outputs that captured the learning taking place. Örténblad (2005) highlighted the need to consider levels of analysis when examining organizational learning. In other words it is necessary to consider whether only individuals can learn, or whether collective learning is possible within such environments. In the case study organization the main units of analysis for the events are project team members and users working on the major change-based IT system roll-out across the case study organization. A questionnaire-based survey was used to gather data. This was conducted electronically via a link emailed to all the attendees after the event. The researcher has also used personal reflection to both develop and assess the effectiveness of the approach as an ongoing activity.

Business Context

The case study organization has been growing rapidly and is moving from a traditional construction/engineering consultancy based operation towards a professional support services and business process outsourcing delivery model. The overall delivery mode, however, remains project-based although there is a trend towards larger “bundled services” contracts. This change means the company needs to maximise the knowledge and learning from delivery of projects and services. This research is aimed at developing an approach that supports this situation by changing lessons learnt processes which will result in continuously improving project outcomes.

The main focus for this stage of the research i.e. the development of the lessons capture processes, was a large scale IT-led transformation project which involved the implementation of a business-wide Enterprise Resource Planning (ERP) software application. This was a business critical project with demanding targets for completion of the various phases to a strict time schedule. The researcher’s role was as a Subject Matter Expert (SME) responsible for ensuring his Division’s interests were taken into account during all project phases. During the project phases opportunities were identified to apply theories of knowledge and learning arising from the research in order to further refine the approach being developed. This was supplemented by running a pilot workshop as part of a management development programme where the managers were engaged in the delivery of service improvement projects across the SME’s Division.

Approach outline

The approach was developed through a number of events. These events were made up of a number of specific elements designed to take the participants through elements of a learning cycle during the workshop. The event was designed to provide time and space for personal reflection, the sharing of ideas and experiences with others and culminates in the capture of the resultant learning. It is important to recognise the different people involved, their roles and contribution to the propagation of the learning cycle.

In the case of the IT implementation project the actors included project team members from different disciplines e.g. engineers, administrators, accountants, management. In turn they represented different parts of the organization i.e. Operations, Finance, Human Resources, IT, Group Functions, different Business streams, different organizations and external partners. In

the case of management development programme actors these were operational managers who were carrying out performance improvement related projects, however, their contributions were equivalent to the project team members from across the business.

The project learning cycle being created through the new approach shown in Figure 1 has seven main elements. Five of the elements are covered in the event itself. These consist of identification of lessons, selection of the best ideas, prioritisation and finally, benefits card preparation. The other two elements are personal reflection which is carried out as pre-work and implementation of the lessons which occurs after the event.

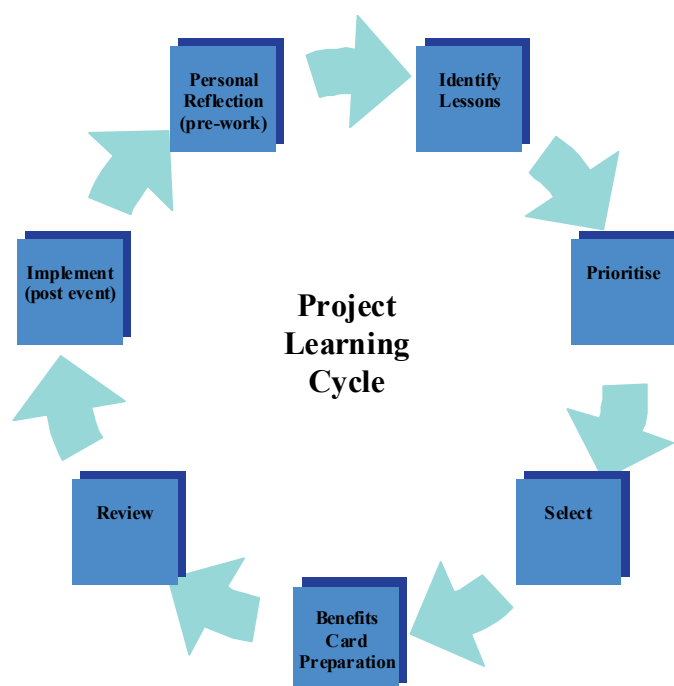


Figure 1.
Project learning cycle.

The key elements of the project learning cycle are pre-work which is followed by an event covering “looking back”, “looking forward” and to finish, population of “benefits realisation cards” which are then implemented. The production of the benefits cards is choreographed by the facilitators. This takes the actors through various processes which are used as a form of action learning from which the actors are able to generate ideas and outputs which fit into the various sections of the benefits card.

During the development of the approach four events were held with a total of 30 attendees. Three events were held over a six month period during an IT systems implementation project and an additional event was held with a group of Line Managers engaged on business improvement projects. The latter was used to test out the approach in a context more closely related to business service delivery. In order to provide a better idea as to how the approach works in practice a more detailed breakdown of the first event is provided in the following section.

Results and analysis

The results and analysis detailed in this section cover: a detailed description of the way in which an event progresses in order to produce the benefits realisation cards; a summary of the outputs obtained for each of the four pilot events that were held; and, finally, extracts and analysis from the event feedback questionnaire and the electronic survey.

Detailed Breakdown of the first pilot

Event session and project learning cycle element covered	Process	Outcomes
Pre-work – aimed at: - self-reflection	Request for participants to give their view of top three successes and top three shortcomings. Proforma sent via email.	Completed by three participants.
Looking back – aimed at: - identifying lessons	In groups review of pre-work & brainstorming ideas for improvement using post-its and “open space” reviews followed by a consolidation exercise	Individual reflection and group learning. Initial list of top twenty lesson opportunities
- prioritisation	Individual voting exercise based on impact vs. ease of implementation	Individual and group learning. Consensus on top ten lesson opportunities.
- selection of lessons	Whole team review to assess priority based on size of benefit, costs, ease of implementation and lead time	Individual and group learning. Prioritisation of top ten lessons for the next stage
Looking forward – aimed at: - completion of benefits realisation cards	Preparation of benefits realisation cards in groups with event recorders to produce cards which are projected onto a wall as they are produced.	Completed benefits realization cards
- reviews	Printed and displayed as they are completed to allow regular “open space” reviews of the outputs	Individual and group learning. Better quality outputs.

Table 1. Breakdown of the first event

Event outputs

The events were designed to last four hours and had a basic agenda that could be adapted to meet the aims and objectives for a particular event. The first IT project based event covered lessons learnt capture and measurement for the first completed phase of the project and was attended by nine delegates. Pre-work was set which requested attendees to identify three examples of what had gone well in the first phase of the roll-out and three examples of what had not gone so well. A total of four benefits cards were produced covering programme roles and responsibilities; leadership; common processes; and, project management. An example of one of the outputs produced at the first event is shown in Table 3 Appendix 1.

The second event concentrated on benefits identification and measurement for the project and was attended by eight delegates. The focus was on examining the potential impact of benefits arising from the implementation of the new IT systems and devising suitable methods of quantifying them. For pre-work the participants were requested to identify five areas of potential benefit. The benefits realization cards from the first event were also circulated at the start. Again, four benefits cards were produced against an original target of six. This occurred due to fewer numbers attending than planned due to project time pressures. The benefits realization cards produced covered procurement, integrated operations, resource planning and billing.

The third event was focussed on business benefits from the project that could arise in a specific business division and was attended by seven delegates. Twenty invitations were sent out to a cross section of team members from which there were eleven acceptances. The pre-work requested participants to identify five possible areas of benefit in their business division. The target of producing six benefits cards was achieved in this instance. The six cards produced covered procurement strategy, operational purchasing, process control, resource planning and financial processes

The event held with the group of Line Managers engaged on business improvement projects generated six Benefits Realisation Cards covering their own particular projects.

Survey results

The response rate for the electronic survey sent to all thirty attendees of the events was relatively good with 15 responses received. Again, due to the small sample size the results shown are from the two free text questions in the survey which give a better picture of the actors' views. The first of the free text questions asked "What are the key learning points you have gained from this workshop?" and was designed to elicit what learning the attendees thought they had obtained. The second free text questions asked "What will you do differently as a result of the workshop?" and was aimed at exploring how the attendees would use the learning they had obtained in practice.

Responses to the first free text question "What are the key learning points you have gained from this workshop?"

In response to this question fourteen of the fifteen respondents to this question gave at least one example. The fifteenth did not provide an example. The forty-six useable examples of key

learning points are shown in Table 2. A grouping analysis was carried out which reveals that there were fourteen examples with references relating to learning from others or networking equating to a third of all responses. This indicates that the workshop had made a reasonable number of the actors think about using their own learning as well as that of others in a wider context across the business. This contributes towards the achievement of the approach aim of promoting a “learning to learn” culture. The grouping also showed that there were fifteen examples with references relating to benefits or outcomes which equated to a third of all responses. Again this indicates that a reasonable number of the participants recognised the need to consider benefits in the context of project learning as a result of the workshop. This showed the second aim of the new approach in terms of promoting benefits measurement was being achieved to some extent.

Learning from others or networking related	Benefits or outcomes related	All other responses
Knowledge of new IT system	Proof that all projects can show indicative quantifiable benefits	Ability to review prior activities in objective manner
Individuals business knowledge of the company	Benefit of talking to CEO	Need more people for the Phase 1 review
Team work	How better to quantify benefits	The importance of good communications
Knowledge	Recording benefits	Methods of feeding back info
Wider Group goals and strategy	Look at the outcomes and not always the outputs	Broader understanding of issues
Value of networking	Cost benefits to the whole company	There is lots of enthusiasm to more than just implement the IT system
Learning from other people on the project and understanding their opinions	Technique to get people thinking about benefits and how they can be measured	Increased communication
Understanding that someone else's priorities won't be mine	Benefit of networking	Understanding
Achievements from the wider business	How to focus on outcomes	The importance of capturing best practice
Working strategically across Business Units	Key business cost savings	Understanding and managing client expectations
Improved my listening skills and questioning techniques (80:20 rule)	Broader understanding of opportunities	Challenges to be faced
How different people view priorities	Analysis on improving future project tasks and activities	To do "warm-up exercise" first, even though difficult, prior to applying it to real projects
Working with the wider business	It's important to track benefits throughout the project life cycle	Better awareness of potential of new system
Networking	Benefits of brainstorming	Confirmation of need for Centres of Excellence approach
	One technique for attempting to estimate benefits	Use of Open Space, impromptu presentations
		Presentation skills and standing up and talking to an audience
		Production of physical outputs gives the workshop more weight

Table 2.
Grouped responses to the first free text question

Responses to the second free text question “What will you do differently as a result of the workshop?”

In response to this question twelve of the fifteen respondents to this question gave at least one example whilst three did not provide any example. The twenty-nine examples given are shown in Table 3.

Immediately	After 3 months	After 6 months	After 1 year
Learning from others or networking related responses			
Promote IT system in discussions	Next lessons learnt session and further	Look at how far the development	Review progress of for the development
Networking with external bodies	define processes and ways of working	programme can integrate with	programme projects
Push for the development programme to cascade to all of the company	Business stream Board to look at the opportunities again after the system becomes more embedded	Innovation Capture Lesson Learnt/ Best Practice and keep a Central file	Try to set up a Lessons Learnt Database
Share output with team	Try benefits realisation exercise with operational groups		
Encourage further cross-collaboration	Ensure best practice is captured and shared		
Ensure lessons learnt are captured through the Weekly Project report sheets	Set up an Improvement Action Plan from Client Feedback Scores		
Use role play feedback when appropriate			
Benefits or outcomes related responses			
Promote thinking around benefits realisation	Review how progress is going on the benefits	Full review to ensure the workshops have been effective	Next lessons learnt session and further
Review current ways of working and see whether they can be improved	Develop techniques for quantifying benefits	Did we get the benefits we committed to?	define processes and ways of working
Ensure that benefits thinking is not lost			Remember it is possible to quantify benefits for all projects, which will enable their promotion.
Ensure the benefits are measured			Review progress of for the development programme projects
Try to quantify benefits of other projects.			Try to set up a Lessons Learnt Database

Table 3. Consolidated responses to the second free text question

The analysis shows there were sixteen responses related to “learning from others or networking” and thirteen responses related to “benefits or outcomes”. This demonstrates that the actors had an even greater intent to apply the learning in practice both in terms of encouraging wider learning and more focus on benefits quantification and realisation. This showed again that the two key aims of the new approach in propagating a “learning to learn” culture and promoting benefits measurement had been to some extent achieved, at least amongst the project team members attending the events.

Discussion

Two key objectives of the new approach are to propagate duetero-learning and promote benefits measurement amongst the actors involved both within a project and across the wider business. Earlier stages of the research revealed that there is difficulty in communicating the complex concepts surrounding learning and its measurement. It was observed that it is possible to overcome this by identifying the benefits of implementing the approach rather than detailed explanation of the abstract theories involved (Note: Self reference to be added here, 2009).

In the event-based approach the underlying theories are enacted by the participants in a form of action learning. These cover Organizational Learning concepts including “duetero-learning” or “learning how to learn” (Argyris and Schön, 1978), reflective practice (Argyris, 1992) and the use of “boundary objects” (Star and Griesemer 1989). This is achieved through the closely facilitated workshop process leading to the production of the benefits cards. These capture the outputs from the event which allows the learning and knowledge held by the actors to be shared and put to use more effectively on other projects.

Reasons why this approach was found to work can be found in the work of Star and Griesemer (1989). They suggested that by using standardized methods and boundary objects the actors involved do not need to know or learn the underlying theories involved in the approach being developed. This helped to overcome the conceptual barriers which have an adverse affect on gaining buy-in or sponsorship from the actors and management where abstract and complex concepts are involved (McCann and Buckner, 2004).

The events and the cards meet some of the key criteria for boundary objects as described by Star & Griesemer (1989) The cards are also capable of being built into a repository of lessons learnt and benefits. They are ideal types in that they have a standard format and categories which provide generalized descriptions that can be adapted and understood by the different stakeholders (i.e. project teams, management, finance, customers and suppliers). The actors involved in the events, although representing different stakeholders, have coincident boundaries in that they are contained within the organizational as well as the project boundary over the project lifecycle. These coincident boundaries are a result of the many different types of actor from different communities involved in the project used for the case study. In this case the actors involved included project team members from across the organization, external consultants working on the project, representatives from the business and the facilitators. Multiple boundaries, therefore, exist across all these areas. The learning derived from the events needs to bridge across the disciplines and communities represented within the project teams and permeate out into the wider business if the benefits of the learning are to be successfully implemented. The benefits realization cards provide the means for carrying this out.

The event itself can be considered to be a form of boundary object (Star and Griesemer, 1989) as it can be adapted to local needs and constraints of the parties involved by making changes to the objectives, agenda, workshop processes and pre-work. The benefits cards maintain identity across the parties by providing a strong common structure for individual use by the participants in their worlds, acting as a means of translation. They also provide a concrete output whilst the workshop process is abstract and weakly structured through the use of “open-space” techniques for the group activity. This makes the tacit knowledge of the actors more explicit which allows knowledge to be more easily shared and the related learning to be implemented by other actors from across the organization.

The events and the outputs enable actors within the project, others working on different projects and those in the wider business to implement the learning from the project being reviewed. This type of boundary spanning process was outlined by Wenger (2000) in his research into communities of practice and associated learning systems.

The event-based approach addresses a common criticism of post project reviews in that they are considered time consuming (Keegan and Turner, 2001; Julian, 2008). The new approach has elements to overcome this difficulty as it is intentionally designed to be a dynamic activity that rapidly moves the actors involved through the successive phases and culminates in the live production of the benefits cards through the use of the event recording staff. The latter are involved in the early brainstorming phases giving them greater insight into the thinking of the actors. This makes it easier for them to populate the cards, which themselves act as “boundary objects” in that they physically carry out the “translation” of the ideas and thinking into explicit knowledge. These objects act as enablers to assist the process of learning across a wide number of actors from different communities. These include project managers, designers, structural engineers, IT specialists, change managers and also, managers across the wider business and members of other teams who will be expected to implement the lessons identified.

The phase-based approach provides an environment and time for reflective learning through the workshop processes and allowed the actors to improve the quality of their work. In this way it can be considered a form of action research conducted by the actors themselves that will improve their practice as proposed by McNiff (2000), a researcher working in the educational sector. This was backed up by the responses to the question in the electronic survey which referred to how the attendees would act differently following the event and here there were many references to measuring benefits and capture of lessons/best practice.

The cards and the events mediated the diffusion of learning and knowledge across the numerous boundaries that exist in large scale projects such as the business wide IT implementation project and the management development programme projects in the case study. The first event spanned the inter project groups of actors; employees from five different business streams and the external implementation consultant specialists. The second event focussed on spanning boundaries outside the project itself to enable the project team members to assist the Business Streams to implement the learning successfully in order to realise the anticipated benefits from running the new system. Finally, the third event brought in members of the management team from a Division to span the boundary between the project team members and the Business Units themselves and included the Managing Director and his management team. The management development programme workshop drew line managers from across the various business units spanning their boundaries.

The cards capture the outputs from the event and the ideas of the participants and thus form a consensus view of what was agreed and what priorities are to be followed in implementing the improvements described in the cards. The various sections have sufficient detail for a suitably experienced senior manager to draw up a detailed implementation plan and set up a team to deliver the benefits. One of the key sections is the “Key contacts for further information” where the people who can explain in detail the thinking behind the ideas are listed. This is another example of the plasticity of the cards in that further information and “translation” can take place after the event itself. In this way the boundary spanning continues over time and the benefits cards do not need to be completed in great detail which makes them easier to read and therefore more flexible as they can be adapted to suit the needs of other actors or departments.

The event dynamics lead to an interactive, high energy session, that allows actors time to think and interact in their preferred style (i.e. time for self reflection, written or verbal interaction, no single spokesperson). The teams are provided with sufficient wall space to produce an “exploded view” of the benefits cards. This along with projection and display of an A3 version of the final cards allows good visualization of the outputs as they are produced.

The number of cards produced is a function of the time available and the number of participants at the event i.e. the larger the number of participants a greater number of cards are capable of being produced. The target for number of benefits realization cards to be produced was only met in the third workshop. This was due to a number of factors. Firstly, the process matured over successive events through reflective review and subsequent changes by the facilitators. These included simplification of the impact assessment and clearer explanations of the event processes. Secondly, some of the actors attended more than one event which increased their knowledge of how the process worked so that they could assist newcomers to the process. Thirdly, the actors at the final event were from a single business division which meant there was increased subject knowledge of the issues, greater ownership of the event outputs and more responsibility for the resulting outcomes.

There were several different outcomes as a result the events as shown in the responses to the electronic survey (see Tables 1, 2 and 3). The participants were able to take the learning they experienced and apply it in their ongoing work on the project and in new contexts. The events also generated renewed interest in achieving and measuring the benefits outlined in the original business case. A separate sub-team was set up to handle this in the area of central finance support activities. The researcher was not involved in this. As a direct result of the first two events the researcher was invited to run the third event. This assisted that part of the business to maximise the benefits from the project in terms of prioritising where changes in their business processes would have most impact.

The wider dissemination of the cards proved more of a challenge and can be linked back to the work on defensive routines by Argyris (1992). There was a reluctance to make the benefits cards available to those outside the project team particularly where there was criticism of management. The latter, although disappointing, would be a challenge for most businesses and to some extent, can reflect the maturity of the business in sharing lessons that may be viewed as overly critical or negative.

Overall, the process identifies measures, sets targets, builds consensus and a case for action in a highly efficient manner. This is demonstrated in terms of the number and the quality of

the outputs. The results show that the initial aims of the research were met in terms of providing better processes to capture and prioritise project lessons in a form that will aid dissemination and implementation, with an emphasis on identifying benefits and their measurement.

Limitations and areas for further research

This study adopted a qualitative approach to the analysis of the results data. This was mainly due to its empirical nature and small sample sizes. The conclusions drawn need further substantiation in future studies related to this or similar approaches. This research could investigate how this type of approach can be fully embedded in an organization by improving the processes of dissemination and implementation. A key requirement is the need for both senior and lower level management buy-in in environment where time pressures are increasing further.

Another area of further investigation would be the adaptation of the process so that it can be applied to small groups or using a virtual workshop approach. The latter could use a mix of face-to-face and webinar/video-conferencing multi-session short duration events.

A limitation to the actual delivery of the approach is the need for multiple facilitators with the right skills to manage the dynamics and time-limited nature of the event and the need to produce credible outputs on the day.

Conclusions

This paper has explored how the process of learning from project reviews can be improved, duetero-learning propagated and the measurement of the resulting benefits can be encouraged. The value of the action-based research developed here is that it provides insight into how the use of boundary object concepts can improve learning in project-based environments. The research demonstrates how processes to capture lessons learnt within projects can be improved in practice. The methodology described is based on structured project learning events that encourage reflective action learning, enable knowledge conversion and generate outputs in the form of benefits card which together act, in effect, as boundary objects. The events create time and space for the participants to reflect on past learning and collectively synthesize the learning in the form of the benefits realisation cards produced. These can then be used by other actors on future phases and other projects. Overall, this allows knowledge and learning to span across the multiple boundaries found in large scale projects. These boundaries can be internal across communities of engineers, management disciplines, business units or the whole organization. They can also be external between partners, the supply chain and wider stakeholders.

These objects can be used to radically improve project learning as they act as a means of translation and communication which allows others outside the project to understand the learning and in particular how improvements can be realised. The cards provide sufficient information for other actors to draw up more detailed plans and signpost the staff who can provide more background to the lesson providing the proposed area for improvement. This is designed to overcome one of the key difficulties surrounding project lessons learnt in that they are not actually learnt until they have been successfully implemented on future projects. The emphasis on encouraging measurement on an empirical basis provides a means of establishing the effectiveness of the learning that has (or has not) occurred.

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Appendix 1

Table 3 Benefits Card Example – in a decomposed format

Classification Element	Outputs from Pilot Event 1 – Lessons learnt & benefits
Functional/ Operational Area impacted	Programme Roles & responsibilities
Benefits Focus	System implementation
Current state	<ul style="list-style-type: none"> - Changing resources - Lack of time to ensure new people are up to speed - People taking on additional activities/tasks making them “stretched” from working extra hours/weekends which impacts on peoples lives, attitudes, task delivery etc - Lack of clarity on roles, responsibilities & links to the business - Extra time spent on tasks already in progress - Lack of planning, communications etc - Lack of resources
Future state	<ul style="list-style-type: none"> - Clearer roles and responsibilities - Highlight tasks/activities that fall down the gaps & plan to mitigate these - Ensure new roles are clearly identified and communicated - Identify succession for business peoples roles - Effective Induction process - Pictures of people on team and their roles - Technical and change teams working together on change management - Improve effectiveness of team via workshops, run through sessions etc - Ensure team members are given necessary skills and tools to be out in the business
Benefits measurement approach & target range	<ul style="list-style-type: none"> - Number of sessions repeated - % of roles defined and communicated - % budget spend over/under vs. target
Benefits Realisation: Critical Dependencies/Barriers	<ul style="list-style-type: none"> - Clarity of key roles and responsibilities - Lack of time and resource to develop job cards - Teams flexibility to adapt to new roles - Reporting structure to be clear - Ensure people have clearly defined roles and are not carrying out their day jobs
Risks/Issues & Mitigating Actions	<ul style="list-style-type: none"> - People not accepting non-Business manager - People feeling uncomfortable about new roles and impacts, possible chance of people leaving - Ensure we have enough resources to fill all required roles
Resources /Actions	<ul style="list-style-type: none"> - PMO to define all key programme roles/responsibilities and communicate to programme
Reviews	<ul style="list-style-type: none"> - Communicate org structures and roles to Steering group
Timescale	<ul style="list-style-type: none"> - Prepare people + picture board
Owner	<ul style="list-style-type: none"> - Outline induction process - Identify post Connect succession plans for project staff - Set up monitoring and produce monthly report on progress for key/critical items only
Key Contacts for further information :	Name, area of expertise, contact details, cv link. Note: This has been deliberately omitted for confidentiality reasons.