



University of Technology, Sydney

Research Thesis

**Understanding Learning within
Information Technology Projects:
an Examination of the
Australian Experience**

By

Stephen Hunt

Submitted in fulfilment of requirements for the degree of
Doctor of Philosophy in Computer Science

University of Technology, Sydney

Date: 20 February 2011

CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that this thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

Production Note:

Signature removed prior to publication.
.....

ACKNOWLEDGEMENTS

The author would like to acknowledge the following people for their assistance and support during the progress of this research:

Dr Ken Dovey of UTS for his inspirational supervision, and the boundless time and encouragement he has given me throughout the course of this study;

All those who were willing to give me their valuable time and assistance by agreeing to provide information for this research study. My thanks to all these friends, colleagues and contributors - your help is greatly appreciated:

Susan Hunt	Ann-Marie Bosco
Samuel Hunt	Susan Wynn
Richard Cantlon	Alex Burger
Anitra Gollings	Frank White
Jason Yeo	Tim Boyd
Kate Carruthers	Raf Stary
Richard Stuckey	Jack Boettcher
Ian Parker	Jeff Bingham
Stuart Gilbert	Greg Loughman
Andrew Twiss	David Owen
John Watson	Chris Dimitropoulos
Pauline Jones	Geoff Burgess
Steve Jones	Brendon Paine
Campbell Scott	Matt Smith
Mark Stewart	Ante Prodan
Chris Walker	Karen Christolis
Joe Donati	John Gleeson
Damir Cuca	Greg Hodge
Martin Silk	James Dummett

DEDICATION

This thesis is dedicated to:

Alfred Ernest Mortiboys

Moseley Birmingham

1872 - 1960

TABLE OF CONTENTS

CHAPTER 1: THESIS INTRODUCTION	1
CHAPTER 2: LITERATURE REVIEW	7
2.1 Introduction	7
2.2 Individual Learning.....	8
2.2.1 Experiential Learning.....	9
2.2.2 Learning Styles	11
2.2.3 The Chronology of Learning.....	14
2.2.4 Mental Models	15
2.2.5 Absorptive Capacity.....	17
2.2.6 Single-loop and Double-loop Learning.....	18
2.2.7 Cognitive Theory of Learning.....	19
2.2.8 Motivation to Learn	20
2.2.9 How the Individual can create Personal Value.....	20
2.3 Learning within the Project Context	21
2.3.1 Cognitive Apprenticeship.....	22
2.3.2 Situated Learning	24
2.3.3 Single and Double-loop Learning in Projects	27
2.3.4 Progress versus Learning	28
2.3.5 The Project as a Community of Practice	29
2.3.6 Learning and Project Leadership.....	31
2.4 Organizational Learning.....	32
2.4.1 Defining the Learning Organization.....	33
2.4.2 How Organizations Learn	34
2.4.3 Understanding the Relevance of Learning	40
2.4.4 Formal Learning versus Informal Learning	40
2.5 Methods for Sharing Project Learning.....	41
2.5.1 Post Project Reviews.....	41
2.5.2 The Role of the Project Management Office.....	45
2.5.3 Management of Codified Knowledge	46
2.6 The One.Tel Experience.....	48
2.7 Conclusion.....	50
CHAPTER 3: SELECTION OF THE RESEARCH METHODOLOGY	52
3.1 Assumptions	52
3.1.1 Ontological Assumptions.....	52
3.1.2 Epistemological Assumptions.....	53
3.1.3 Human Agency Assumptions.....	54
3.1.4 Methodological Assumptions.....	55
3.2 Research Methodology Options.....	55
3.2.1 Ethnography	56
3.2.2 Grounded Theory	57
3.2.3 Phenomenology.....	57

3.3	Choice of Research Methodology	58
CHAPTER 4: SELECTION OF RESEARCH SUBJECTS		60
4.1	Introduction	60
4.2	Research Participants.....	60
4.2.1	Research Subject Roles	62
4.2.2	Organizational Viewpoint	62
4.2.3	Role Tenure.....	63
4.2.4	The Gender Divide.....	64
4.2.5	Sources of Participants	64
4.3	Project Selection Criteria.....	65
4.3.1	Projects by Industry Group	66
4.3.2	Project Type	67
4.3.3	Project Size and Scale	68
4.4	Ethical Considerations	69
4.5	Conclusion	70
CHAPTER 5: RESEARCH DATA ACQUISITION		72
5.1	The Data Collection Process	72
5.1.1	The Data Acquisition Timetable	72
5.1.2	Project Profiling	73
5.1.3	Interview Method	74
5.1.4	Questioning Technique	74
5.1.5	Refining the Interview Process	76
5.2	Interpretation and Classification	76
5.2.1	Units of Interest.....	77
5.2.2	Hermeneutic Interpretation	78
5.2.3	Classification and Grouping.....	79
5.2.4	Dominant Themes	80
5.2.5	Limitations within the Research.....	81
CHAPTER 6: UNDERSTANDING THE PROJECT MILIEU		83
6.1	Introduction	83
6.2	The Project Setting	84
6.2.1	Project Composition.....	85
6.2.2	The Prevailing Organizational Culture.....	85
6.2.3	Fixed Price Vendor Agreements	90
6.2.4	Project Initiation.....	92
6.3	Project Structure and Management.....	95
6.3.1	Project Governance	95
6.3.2	Project Methodologies	99
6.3.3	Project Management.....	100
6.3.4	Building Team Relationships	102
6.3.5	The Importance of Planning.....	103
6.3.6	Communications	105
6.3.7	Project Location	108

6.4	Project / Business Relationships	109
6.4.1	Empowerment	110
6.4.2	Project Champions	112
6.4.3	The Entrepreneurial Approach	113
6.4.4	Aligning IT with Business	113
6.4.5	Building Trust	114
6.4.6	Relationship Management	117
6.5	The One.Tel Case	119
6.5.1	The Background	120
6.5.2	The Billing Project	121
6.5.3	The Finale	122
6.6	Conclusion – the Project Milieu	123
 CHAPTER 7: THE PROJECT LEARNING PHENOMENON		 124
7.1	The Nature of Individual Learning	125
7.1.1	Interpreting Individual Learning	126
7.1.2	Styles of Learning	129
7.1.3	Learning Styles and Project Leadership	137
7.1.4	Mental Models in Practice	139
7.1.5	Learning through Risk Taking	141
7.1.6	Motivation to Learn	145
7.1.7	The Gender Difference	146
7.1.8	Learning from the One.Tel Project	150
7.2	Team Learning within Projects	151
7.2.1	Cognitive Apprenticeship	151
7.2.2	Formal Training	152
7.2.3	Situated Learning	153
7.2.4	Progressive Reviews	155
7.2.5	Dialogue and Creative Abrasion	157
7.2.6	The Project as a Community of Practice	159
7.3	Knowledge Transfer into the Organization	160
7.3.1	The Corporate Mental Model	160
7.3.2	Organizational Absorptive Capacity	161
7.3.3	The Post Implementation Review	163
7.3.4	The Project Management Office	165
7.3.5	Business Champions	166
7.3.6	Explicit Knowledge Creation	167
7.4	Summary of Project Learning	168
 CHAPTER 8: THESIS CONCLUSION		 169
8.1	The Third Frontier	169
8.2	Researched Project Outcomes	170
8.3	The Relationship between Learning and Project Success	171
8.4	The Learning Organization	173
8.5	Effectiveness of the Research Process	174
8.6	Finale	175

APPENDIX 1: SUMMARY OF PROJECTS RESEARCHED.....177

APPENDIX 2: PROJECT DESCRIPTION AND TYPE179

APPENDIX 3: PROJECT SIZE AND SCALE.....181

APPENDIX 4: ASSESSMENT OF PROJECT OUTCOME.....183

APPENDIX 5: INFLUENCES ON INDIVIDUAL LEARNING185

**APPENDIX 6: HERMENEUTIC INTERPRETATION OF INDIVIDUAL
LEARNING187**

APPENDIX 7: INTERPRETATION OF COLLECTIVE LEARNING.....194

**APPENDIX 8: ORGANIZATIONS FOR WHICH THE AUTHOR HAS WORKED
.....197**

APPENDIX 9: ORGANIZATIONS INVOLVED IN THE RESEARCH198

LIST OF REFERENCES.....199

LIST OF FIGURES

FIGURE 1.1: IT PROJECT OUTCOMES 1994 AND 2006.....	3
FIGURE 2.1: THE CONCENTRICITY OF PROJECT LEARNING	7
FIGURE 2.2: THE RELATIONSHIP BETWEEN THEORY AND PRACTICE.....	9
FIGURE 2.3: THE EXPERIENTIAL LEARNING CYCLE	10
FIGURE 2.4: KOLB’S LEARNING CYCLE WITH LEARNING STYLES	11
FIGURE 2.5: HONEY AND MUMFORD’S LEARNING STYLES	12
FIGURE 2.6: SUMMARY OF LEARNING STYLES	12
FIGURE 2.7: THE CHRONOLOGY OF LEARNING	15
FIGURE 2.8: THE LOOP THEORY OF LEARNING	18
FIGURE 2.9: VYGOTSKY’S ZONE OF PROXIMAL DEVELOPMENT.....	23
FIGURE 2.10: THE PROJECT LEARNING PENTAGON.....	25
FIGURE 2.11: THE PDCA EXPERIMENTATION CYCLE	28
FIGURE 2.12: THE TRADE-OFF BETWEEN PROJECT LEARNING AND PROJECT PROGRESS	29
FIGURE 2.13: THE PROJECT MANAGER’S LEARNING CYCLE.....	32
FIGURE 3.1: THE SUBJECTIVE / OBJECTIVE DIMENSION	52
FIGURE 3.2: SUMMARY OF RESEARCH APPROACHES	56
FIGURE 3.3: RESEARCH METHODOLOGY SELECTION	59
FIGURE 4.1: RESEARCH CANDIDATE FUNCTIONAL ROLES	62
FIGURE 4.2: SPONSOR SUBJECTS VS. VENDOR SUBJECTS	63
FIGURE 4.3: PERMANENTS VS. CONTRACTORS	63
FIGURE 4.4: MALES VS. FEMALES	64
FIGURE 4.5: SOURCING THE CONTRIBUTORS.....	65
FIGURE 4.6: PROJECTS BY INDUSTRY GROUP	66
FIGURE 4.7: THE PROJECT GOALS AND METHODS MATRIX	67
FIGURE 4.8: RESEARCHED PROJECT TYPES	68
FIGURE 4.9: PROJECT SIZE GROUPINGS.....	69
FIGURE 5.1: SCHEMATIC OF THE DATA SOURCING PROCESS.....	72
FIGURE 5.2: INITIAL PROJECT PROFILING QUESTIONNAIRE.....	73
FIGURE 5.3: INTERVIEW CHECKLIST	75
FIGURE 5.4: SCHEMATIC OF THE DATA INTERPRETATION PROCESS	77
FIGURE 5.5: THE HERMENEUTIC CIRCLE.....	78
FIGURE 5.6: STEPS IN HERMENEUTIC ANALYSIS	79
FIGURE 5.7: CLASSIFYING UNITS OF INTEREST	80
FIGURE 6.1: THE PROJECT MILIEU	83
FIGURE 7.1: PROJECT LEARNING ASSOCIATIONS	124
FIGURE 7.2: INFLUENCES ON INDIVIDUAL LEARNING	125

FIGURE 7.3: INTERVIEWEE LEARNING STYLES..... 129
FIGURE 7.4: MENTAL MODELS AMONG THE RESEARCH GROUP..... 140
FIGURE 7.5: PROJECT LESSONS LEARNED FROM PROJECT 22 164
FIGURE 8.1: ASSESSING PROJECT OUTCOMES 171

ABSTRACT

Information Technology (IT) is one of the great drivers of organizational change, and initiating projects to apply new technology and systems is the means by which such changes are implemented. Effective learning is an essential focus of the innovative and successful organization of today, and IT projects present a major opportunity to generate important new knowledge for individuals and organizations. The majority of the research and literature that is concerned with workplace learning focuses on a stable and long-term workforce. Projects, however, have a temporary existence and a transitory work team. My research is concerned with understanding the significance of learning within Australian IT projects, and discovering how new knowledge is generated and exploited for the benefit of the individuals and organizations involved. The research methodology selected was phenomenology, and a series of in-depth interviews was conducted with carefully selected participants from a wide and representative range of Australian IT projects. The epistemological assumptions that sustain this approach are that the requisite knowledge exists in tacit form in the minds of those who have experienced the phenomenon of learning in projects.

The collected data was subjected to deep hermeneutic interpretation and this enabled the development of a rich understanding of the many different facets of the project learning phenomenon. At the individual level the intensity of the learning experience was found to be influenced by the participant's existing frames of reference and the level of motivation and confidence to transform them when appropriate. Projects involving a high level of tension, with opportunities for experimentation, presented particularly powerful learning experiences. The research also highlighted evidence of absorptive capacity, where more experienced practitioners were able to learn new skills faster and with less stress than those less practiced. At the team learning level, there were some examples where teams had bonded into effective learning units, but generally power sharing was limited, and decision-making largely centralised. At the organizational level, the transfer of new project knowledge was erratic: efficient methods for receiving and making use of such knowledge were largely absent. In some instances there was evidence of organizational absorptive capacity: where projects were reprises of previous failed ventures there was sufficient retained corporate memory to ensure success at a subsequent attempt.