

Typologies of transformation:

learning, environmental responsibility, and the UK construction industry

Alison Clare Pooley

Submitted for the degree of Doctor of Philosophy

Welsh School of Architecture, Cardiff University

23rd September 2016

ACKNOWLEDGEMENT

Firstly, thank you to all those who provided invaluable support in various forms over the past years, every word of encouragement meant a great deal. I would particularly like to thank all the busy professionals who gave their time freely to share their thoughts and experiences. Without their willingness to participate this research would not have been possible.

I would also like to thank my supervisors, Dr Andrew Roberts and Dr Julie Gwilliam for their guidance and unrelenting patience. I am extremely grateful for the support received from the Centre for Education in the Built Environment, formerly part of the subject network of the Higher Education Academy.

I acknowledge the support of my colleagues, both in Wales and Essex. Particular thanks go to Mike Thompson, Professor Munir Morad and Professor Tom Woolley for their comments and encouragement.

To my dear family and friends and their unending love. Gratitude to my parents, who never once questioned my reasons for doing anything or my ability to do it. Marion Nash and Tisha Egashira for their scrutiny of early papers, Jo and Alison Beckett, and Jane Perrott for their relentless support and insight.

Lastly to Rupert, who gave me the strength to continue, and Lauren, who never once doubted her mother.

DEDICATION

for Dawnie

SUMMARY

This thesis explores the potential opportunities for change that lie between experience, learning, and the transformation of individual and professional perspectives. The emphasis of the research is on engaging current practice within the UK construction industry in order to respond more immediately to profligate energy and material use and wider environmental impacts. The research places the industry in a specific framework hinged around three main realms: environmental responsibility, learning, and the built environment.

Impacts and opportunities for change are explored through qualitative research based on intensive interviews with twenty-seven individuals who worked on building projects, where a commitment to an environmental agenda went beyond the requirements of UK building regulation. The work examines experiences based in reflective practice, the emphasis being on how practice can change in order to respond to imperative environmental issues. The research focuses on architects, clients, contractors, and engineers who worked on one of four built projects. From the analysis of the interviews emergent themes are formed, which in turn inform typologies of transformation.

The research suggests that reflecting on experience can play a crucial role in developing a deeper understanding of the potential for learning and transformation within professional practice. A focus on open collaborative working, where shared values are embedded, was valued highly. Whilst experiencing new ways of working was found to be transformative, this was not the only path by which practice was challenged. Relying on legislation and regulation alone to drive change is questioned, with particular doubt cast over formal assessment processes. This suggests that a re-framing is required to enable the industry to address environmental impacts beyond acquiring skills and knowledge. Reflecting on practice, which has the potential to be transformative and restorative, remains a neglected route to change with the construction industry.

This page left blank intentionally

Contents

Introduction.....	1
Research aim.....	3
Outline of thesis	6
Chapter 1: Defining the research realms.....	10
1.0 Introduction.....	10
1.1 Defining environmental responsibility.....	10
1.1.1 A brief history of environmentalism.....	10
1.1.2 An outline of an ethical approach	13
1.1.3 Values and environment.....	17
1.2 Defining the built environment	19
1.2.1 Impacts and policy.....	20
1.2.2 Professional regulation and education.....	26
1.2.3 Technology and a changing industry.....	33
1.3 Defining learning	37
1.3.1 Learning theory: an overview.....	39
1.3.2 Learning as an adult	43
1.3.3 Learning as transformation	50
1.4 Summary	56
Chapter 2: Research methods, processes and techniques.....	60
2.0 Introduction.....	60
2.1 Conceptualisation.....	63
2.2 Initial study.....	66
2.3 Main study.....	70
2.3.1 Project sampling.....	71
2.3.2 Project outlines.....	74
2.3.3 Research interviews.....	76
2.3.4 Transcribing.....	85
2.3.5 Analysis.....	86
2.4 Limitations of processes and techniques.....	94
Chapter 3: Four People.....	100
3.0 Introduction	100
3.1 Arthur the Architect: Project 1 (P1).....	102
3.1.1 Early experience shapes practice.....	103
3.1.2 Learning through action.....	105
3.1.3 Engage and change – challenges of the profession.....	108

3.2 Enzo the Engineer: Project 2 (P2).....	110
3.2.1 Motivations	111
3.2.2 Performance and regulation.....	114
3.2.3 Future communities and the global context	116
3.3 Colin the Contractor: Project 3 (P3).....	118
3.3.1 Making assessment meaningful	118
3.3.2 Wider responsibility	121
3.3.3 Perspective.....	124
3.4 Clive the Client: Project 4 (P4).....	125
3.4.1 Re-framing.....	125
3.4.2 Building design and assessment	127
3.4.3 Occupiers, markets and transformation	130
3.5 Summary.....	132
Chapter 4: Four Professions.....	135
4.0 Introduction	135
4.1 Architects	136
4.1.1 Making it better.....	137
4.1.2 Agency.....	139
4.1.3 Losing ground.....	141
4.2 Engineers.....	145
4.2.1 Early involvement	145
4.2.2 Challenge and change	147
4.2.3 Knowledge and dissemination	150
4.3 Contractors	151
4.3.1 Practical action.....	152
4.3.2 Making it work	155
4.3.3 Tried and tested	156
4.4 Clients	158
4.4.1 Doing the conducting.....	159
4.4.2 Thinking long term.....	161
4.4.3 Pushing a paradigm.....	163
4.5 Summary.....	165
Chapter 5: Four Projects	167
5.0 Introduction	167
5.1 Project 1 – House	169
5.1.1 Research	170
5.1.2 Perception	172

5.1.3 Practice	173
5.2 Project 2 – School semi-rural.....	175
5.2.1 Vision	176
5.2.2 Constraints.....	178
5.2.3 Carbon	179
5.3 Project 3 – School urban.....	181
5.3.1 Making it mainstream	182
5.3.2 Materials matter	184
5.3.3 Beyond the building.....	186
5.4 Project 4 - Commercial	188
5.4.1 Aspirations	188
5.4.2 Expectations.....	190
5.4.3 Legacy.....	191
5.5 Summary	194
Chapter 6: Nine themes	196
6.0 Introduction	196
6.1 Emergence of the themes.....	197
6.2 Commitment	199
6.2.1 the deep end.....	199
6.2.2 just who I am.....	204
6.2.3 doing the right thing.....	207
6.3 Collaboration.....	212
6.3.1 sharing ambitions.....	213
6.3.2 feeling and being separate.....	215
6.3.3 valuing reflection.....	217
6.4 Compliance	220
6.4.1 pushing boundaries.....	221
6.4.2 ticking boxes.....	223
6.4.3 anticipating change	226
6.5 Summary.....	229
Chapter 7: Discussion.....	232
7.0 Introduction.....	232
7.1 Implications of the research	232
7.1.1 Typologies of transformation	233
7.2 The built environment	235
7.2.1 Legislation and regulation.....	239
7.2.2 Performance and assessment	240

7.3 Learning.....	241
7.3.1 Informal and non-formal learning.....	242
7.3.2 Learning as transformation	244
7.4 Environmental responsibility.....	246
7.4.1 Technology and ecology	247
7.4.2 Individual and collective action.....	247
7.5 Summary.....	249
Chapter 8: Conclusion	251
8.0 Introduction.....	251
8.1 Research aim.....	251
8.2 Limitations and reflexivity.....	252
8.3 Recommendations for further research.....	256
8.4 Concluding remarks.....	258
References.....	260
Appendix A Participant information.....	284
Appendix B Interview summary sheets.....	285
Appendix C Interview headlines.....	304
Appendix D Emergent themes.....	306
Appendix E Learning theory matrix.....	307
Appendix F Extracts from NVivo nodes.....	308

List of Figures

Figure 1 Realms of investigation, spheres of influence & connecting motivations.....	5
Figure 2 Thesis structure: opening out model after Dunleavy.....	7
Figure 3 Research interviews - main projects, scoping projects, and professions.....	9
Figure 4 Process model of building after Pultar.....	31
Figure 5 Change emanates from personal to wider community.....	38
Figure 6 Lewinian Experiential Learning Model after Kolb.....	41
Figure 7 Routes through learning: from surface to deep.....	45
Figure 8 The processes and dimensions of learning after Illeris.....	47
Figure 9 The advanced model of workplace learning after Illeris.....	48
Figure 10 Simplified idealised trajectory to transformation.....	50
Figure 11 Increasingly complex epistemologies after Kegan.....	54
Figure 12 Research interviews - main projects, scoping projects, and professions.....	61
Figure 13 The research process – route taken and participants interviewed.....	62
Figure 14 The three lenses of analysis.....	87
Figure 15 Sample coding by hand - interview number 1	90
Figure 16 Sample coding by hand - interview number 2	91
Figure 17 General meaning and relevant meaning.....	92
Figure 18 An example of emerging themes: interview number 1.....	93
Figure 19 The three lenses of analysis applied to extract from a transcript.....	94
Figure 20 Focus on the generated knowledge through the lens of the individuals.....	100
Figure 21 The four characters in the chapter.....	101
Figure 22 Focus on the generated knowledge through the lens of the professions.....	135
Figure 23 The era of the project manager and sub-contractor after Farrell.....	143
Figure 24 Focus on the generated knowledge through the building project lens.....	167
Figure 25 Each project profile is supported by the research interviews.....	168
Figure 26 The nine emergent themes in three sections.....	196
Figure 27 Focus on the generated knowledge through three lenses.....	198
Figure 28 Examining an emergent theme through three lenses.....	197
Figure 29 Commitment: emergent themes mapped against each analytical lens.....	199
Figure 30 Direct and indirect experiences leading to transformation.....	202
Figure 31 Collaboration: emergent themes mapped against each analytical lens.....	212
Figure 32 Compliance: emergent themes mapped against each analytical lens.....	221
Figure 33 Realms of investigation, spheres of influence & connecting motivations.....	233
Figure 34 Emergent themes and opportunities for transformation.....	235
Figure 35 Process model of building after Pultar revised.....	237
Figure 36 Routes through learning: from surface to deep.....	242
Figure 37 A shared ambition – dream and reality.....	259

List of Abbreviations

ACD	Accepted Construction Details
ARB	Architects Registration Board
BAU	Business As Usual
BIM	Building Information Modelling
BRE	Building Research Establishment
BREEAM	Building Research Establishment Environmental Assessment Method
CCA	Climate Change Act
CIBSE	Chartered Institute of Building Services Engineer
CIOB	Chartered Institute of Building
COP	Conference of the Parties
CPD	Continuing Professional Development
CSH	Code for Sustainable Homes
CSR	Corporate Social Responsibility
ECO	Energy Companies Obligation
ER	Environmental Responsibility
ESD	Education for Sustainable Development
FiT	Feed in Tariff
GHG	Green House Gas/es
HE	Higher Education
ICE	Institute of Civil Engineers
IPCC	Intergovernmental Panel on Climate Change
ISE	Institution of Structural Engineers
LEED	Leadership in Energy and Environmental Design
POE	Post Occupancy Evaluation
PV	Photo Voltaic cells
RHI	Renewable Heat Incentive
RIBA	Royal Institute of British Architects
RICS	Royal Institute of Chartered Surveyors
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change

Introduction

What sort of education is this if it prevents us from thinking of things ready to be done immediately? What makes us think we need electricity, cement, and steel before we can do anything at all? The really helpful things will not be done from the centre; they cannot be done by big organisations; but they can be done by the people themselves (Schumacher [1973] 1989:184).

Schumacher's words capture perfectly the scope of my research: small-scale, focused on experience, and based in an industry with an unrelenting appetite for electricity, cement and steel. Since the end of the twentieth century, the debate regarding resource depletion, environmental degradation, greenhouse gas emissions and climate change has gathered pace, and many now see the threat of climate change and associated feedbacks as *the* imperative issue facing humanity, one that we are reluctant to address (Hillman and Fawcett 2004; Marshall 2014; Meadows et al. 2005; Stern 2006). The transformation of the construction industry is of utmost importance in these times of ecological fragility and increasing certainty of the anthropogenic impact on climatic behaviours (IPCC 2013). The intended and unintended consequences of building are far reaching, and have been well documented over several decades. Given our unrelenting need to construct shelter, to build using finite resources, combined with an increasingly urban population it appears imperative to address the environmental impacts of these activities within the context of the construction industry (Girardet 2008).

This research explores the relationships between learning, experience, and the transformation of individual perspectives and professional practice, with specific reference to the construction industry in relation to **environmental responsibility**¹. The aim of the research is to explore how experience can influence learning and change, developing a deeper understanding of the potential for transformation². The uniqueness of the research lies in a transdisciplinary contribution to existing knowledge by combining transformation theory and environmental behaviours within a built environment context. Emphasising the imperative for built environment professions - described by Hartenberger (2012:61) as those directly and indirectly

¹ **Environmental responsibility is defined by the author as; being accountable for one's actions that in turn affect the conditions under which life is developed.**

² Transformation is defined in this research as a deep and lasting change, as applied to the transformation of ambition, working practices, individual actions, and perspectives.

involved in the design, operation, preservation, and development of the built environment - to respond to the environmental agenda in ways that allow for learning and transformation beyond skill acquisition.

Drawing specifically on the processes and techniques of qualitative research, the outcomes are based on twenty-two interviews with twenty-seven individuals employed in the UK construction industry, who worked on building projects where commitment to an environmental agenda went beyond legislative requirements. As Guy and Moore (2007:21) argue there is a need to challenge the isolated categories of “building design, building science, social science and industrial ecology”, and move towards critical transdisciplinary research, where these concepts are expanded to address the complexity of our built environment. Jamison (2010) maps out the issues that engulf the debate around science, technology and society, and advocates for change orientated research. These issues have been variously explored through research and teaching programmes addressing education for sustainable development (ESD) within higher education (HE), but there have been fewer research projects specifically focused on and based within professional practice within the construction industry. What research there has been into environmental responsibility (ER) within the industry has placed an emphasis on the dissemination of professional knowledge and skills for sustainability rather than exploring values and experience.

The concept of transformation adopted is informed by the work of Mezirow (1991) and the dialogues which expand transformation theory to examine transformation of place and person beyond the cognitive realm (Cranton 1996; Dirkx et al. 2006; Taylor 2000). Transformation and transformative learning theory are used to inform a position and are examined alongside other adult learning theories, where agreement within the literature suggests that reflection is key to the journey a learner makes and is additionally significant in professional development (Mezirow 1991; Moon 1999; Schön 1991). As such an emphasis is placed within this research on the importance of experience and reflective practice.

The terminology of sustainability is purposefully subordinated within this thesis and the concept of *environmental responsibility* used in preference to describe the

ambition, one that is based more specifically in the environment and adopts the language of responsive construction, whilst at the same time detaching from the less well defined concept of sustainable development.

Research aim

The aim of the research is **to examine how practice within the construction industry can influence learning and change by exploring the experiences of professionals who have worked on projects that demonstrate an environmental responsibility (ER)**. The research specifically focuses on projects that demonstrate the phenomenon of construction that demonstrates ER beyond the requirements of UK building regulation. By bringing frameworks together that are not usually used in this context, dominant practice within the industry is questioned through experience, and meaning explored through non-dominant practice. The research argues that it is more useful to examine positive actions and why professionals work beyond regulation, than to look at why people do not. In this respect engaging in dialogue with those who *do* adopt environmentally responsible practices within the industry, and finding meaning within their experiences, can inform future practice; questioning the current problematic issues within the industry where profligate energy and material use is often rewarded and awarded and where wider ethical responsibilities of equity and fairness appear to be neglected. As Fox states:

we need to be alive to the fact that human constructions [...] are around for a relatively long time and that the world is changing. Thus, our idea of what constitutes the most responsively cohesive built environment today [...] might not correspond to our idea of what constitutes the most responsively cohesive built environment tomorrow (Fox 2009b:18).

Fox argues for a responsive cohesion as a foundational value, a coherence in the built environment which arguably includes an approach to environmental impact as an expression of context, being alive to the impacts of our built environment not only now but into the future. Focusing on the experiences of architects, engineers, contractors and clients across four building projects, this research explores what Fox describes as a responsive cohesion through what is described in this research as ER, moving beyond the quantitative data of building performance, and the focus

on skills, tools, or knowledge to explore experience, learning, and the potential transformation of practice within the industry.

The research asks the following questions:

- What learning takes place as a result of the experience of working on buildings with a clearly defined environmental ambition?
- How does the everyday taken for granted experience in a professional context enact a transformation in professional practice?
- What role do projects that are built beyond the requirements of building regulation play in professional learning within the construction industry?
- How does the experience of working on a building that is built beyond the requirement of building regulation influence individual practice, and how can this inform the wider built environment professions?

These questions are critical as they orientate around experience and individual action and how that can influence the wider profession towards greater ER, rather than a top down approach, which much of the research to date has centred on. This research places the construction industry in a specific framework, hinged around three main realms of investigation: environmental responsibility, learning, and the built environment. These realms were developed as a response to questions I was asking of the industry as both a practitioner and educator, and from the outcomes of prior research and teaching. In this sense the realms represent the research, as it is presented here, and my own identity as a practising professional within built environment education and the construction industry. The interconnected nature of the three realms is described in figure 1. This model is used to explore potential dynamic links between the research realms and motivations for action leading from personal values, commitment to processes, and ambition. These potential relationships are explored through complex experiences and are discussed in depth throughout chapters 3, 4 and 5, with the key emergent themes discussed in chapter 6. Each realm is outlined below, and explored in greater detail in chapter 1.

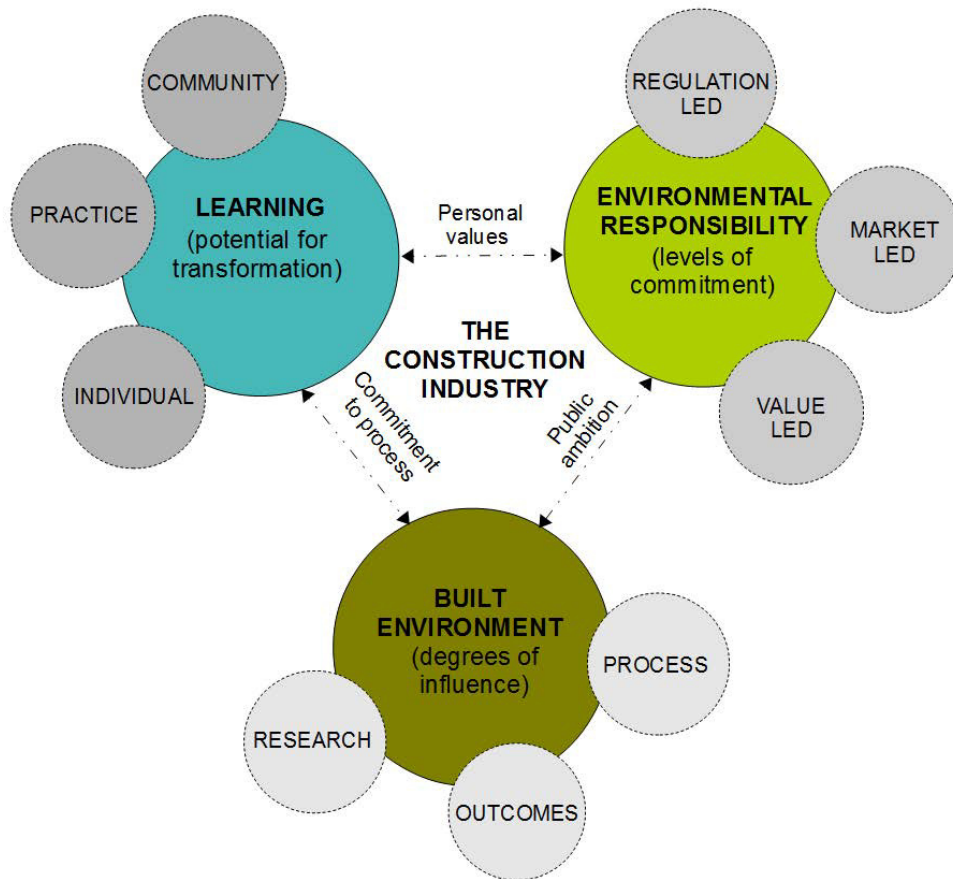


Figure 1. Research realms, spheres of influence and connecting motivations

Each realm has spheres of influence exerting a force on practice. The research explores these realms in terms of individual experiences, and how, if at all, these have led to transformation. As an example: a level of commitment to **environmental responsibility** can be exerted through regulation - in the form of building control, by economics - in the form of market forces, or by values – the values held by a client for example.

Learning occurs throughout and across our lives and is not confined to formal learning contexts, such as school, college, university, or established training institutions. Changes in behaviours and values require a new kind of thinking, inspired and informed by learning (Wals and van der Leij 2007:17). Learning as an adult is likely to occur in more informal, or non-formal situations, informal learning taking place as part of everyday life and outside of any intentional process, non-

formal learning taking place at work or through an association or club (Alheit 2009:117). Throughout this research the term informal learning is used to define the type of learning explored, as it is not formally established, not determined or controlled by a workplace or club, is lifewide. This research explores what is discussed in phenomenology as the taken for granted everyday, the lifeworld (Clegg 2013). Learning, in this sense is influenced by community, practice, and individual action, and is not confined to formal learning situations or established routes to professional qualification.

The **built environment** influences, and is influenced by, the processes and outcomes of construction, research is also highlighted as an influence as it exerts a force on current and future practice. As with the other two realms these influences are dynamic and change, and are included here as a contextualisation of the research aims rather than a commentary on the construction industry as a whole, or the research outcomes more specifically.

Outline of thesis

Learning is a process with many events influencing and modifying each other simultaneously. A process in constant flux is difficult to describe in a linear manner (Moon 2004:11)

The overall shape of the thesis is informed by the opening out model proposed by Dunleavy (2003:61), and illustrated in figure 2. Dunleavy suggests moving to a discussion of research methods and outcomes quickly, placing primary emphasis on the original work within the research. A literature review sits within chapter 1, and is woven throughout subsequent core chapters, culminating in a discussion of the emergent themes in chapter 6, prior to the discussion and concluding chapters.

Chapter 1 focuses on the immediate issues tackled within the thesis, exploring key concepts and critically reviewing the existing literature; defining the research and placing it in context. The chapter draws together the main concepts explored, including why the research is significant to both academic and industry professionals, and defines the three key realms of the research; environmental responsibility, learning, and the built environment (see figure 1).

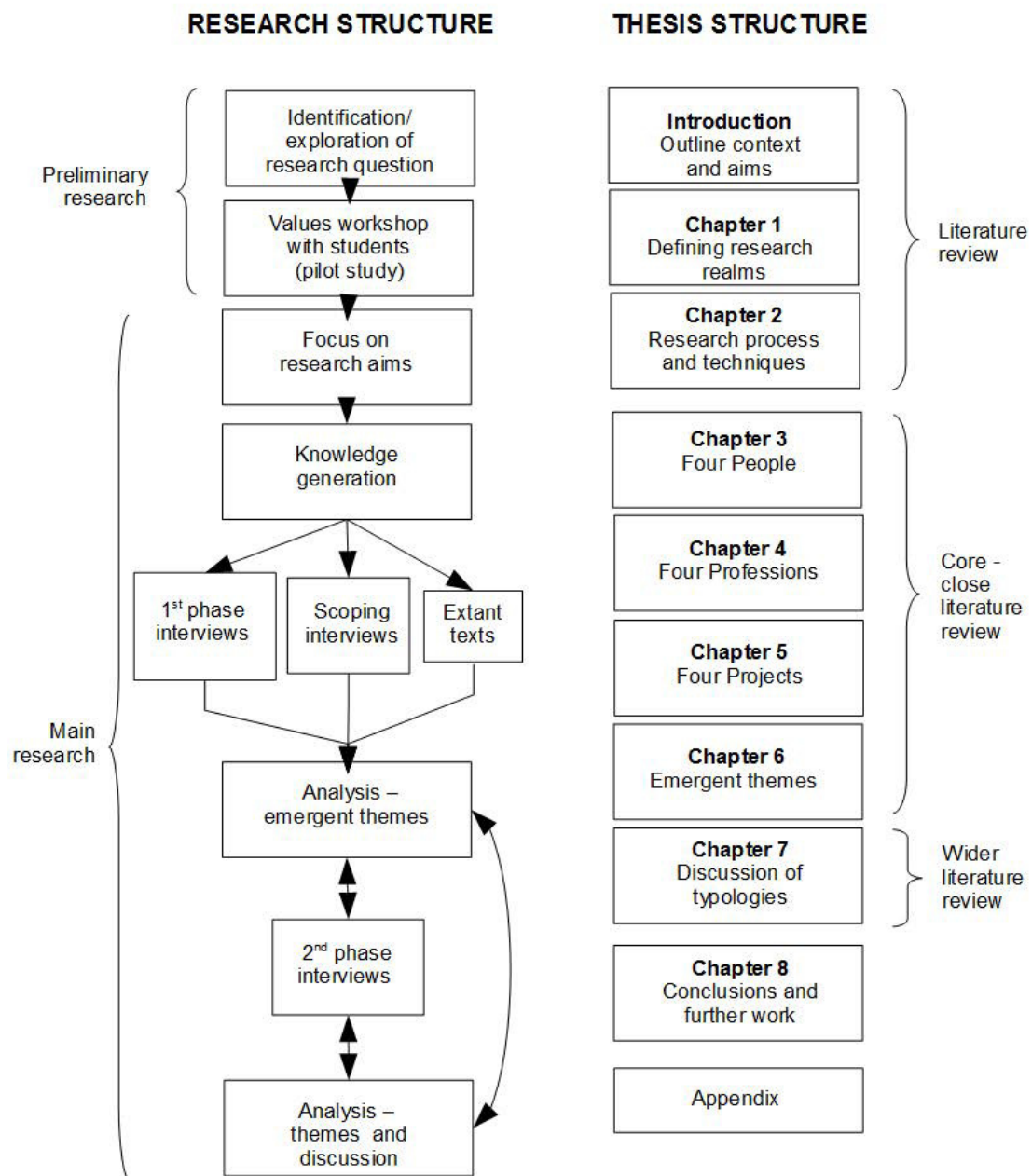


Figure 2. Thesis structure: opening out model, after Dunleavy (Dunleavy 2003:61)

Chapter 2 focuses on how research processes and techniques were developed and considers the theoretical underpinning of the approach adopted. Models depicting the shape of the research process explain the relationships between the projects, the construction industry professions, and the individual participants. Chapter 2

expands on the pluralist approach taken in the analysis, where the experiences contained within the generated knowledge have been examined from three perspectives; the individual participant, the construction professions, and the building projects.

Chapter 3 examines closely the experiences of four of the research participants, one person from each of the four projects outlined in chapter 2 (see figure 3). The work of this chapter is to present the generated knowledge from the two phases of interviews; phase one conducted in 2010/11, and phase two conducted in 2014. Each individual featured in chapter 3 additionally represents one of the four construction professions; architect, engineer, contractor or client.

Chapter 4 brings together the experiences of all twenty-seven research participants and uses a prosopographic lens to focus on the collected experiences of each profession; the architects, engineers, contractors, and clients. Chapter 4 cuts through the generated knowledge in a different direction, and looks at issues of collective experience, environmental action, professional relationships, and learning. As with the previous chapter there are distinct yet inter-related sections within this chapter, each section focusing on one of the construction professions.

Chapter 5 is divided into four sections, each section acting as a vignette for each of the four building projects examined within the research. Chapter 5 more closely explores the experience of each building project as a transformational opportunity, investigating the impact the project has had on industry professionals and a wider community. This discussion enables the projects to be placed in a context relative to their unique position within the industry and the research.

Chapter 6 is the final of the four core chapters in the thesis. The outcomes are discussed in terms of nine key emergent themes. The reflective nature of chapter 6 reinforces the heuristic nature of the construction industry and the research.

Chapter 7 draws together the detailed outcomes from preceding chapters and expands on the central focus of the research, the outcomes and impacts within each research realm. This penultimate chapter discusses further how environmental

practice within the construction industry can influence learning and change, and the role experience plays, through the typologies of transformation.

Chapter 8 concludes on the wider aspects of the research and the research aim, reflexively commenting on the limitations, as well as making recommendations for future research, identifying where and how the debate could be moved beyond the construction industry towards wider issues of adaptation, behaviour change, and transformation.

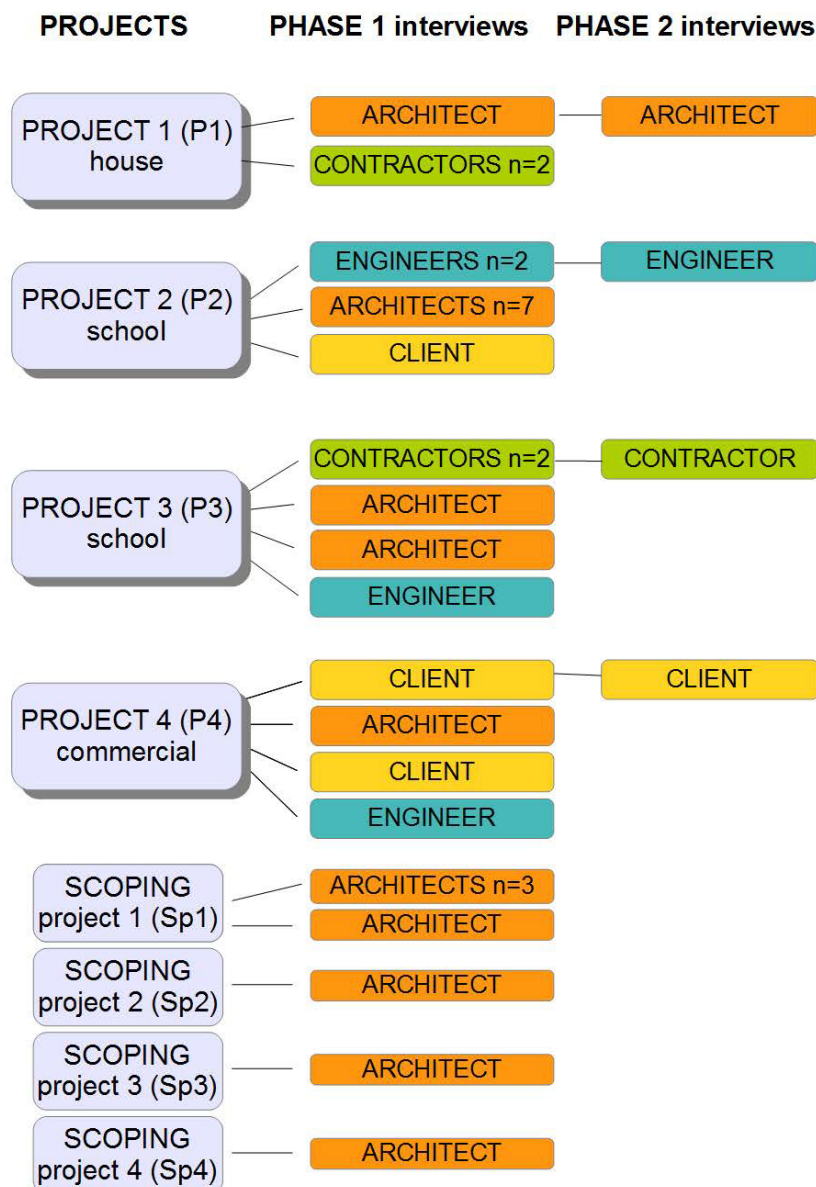


Figure 3. Research interviews - main projects, scoping projects, and professions

Chapter 1: Defining the research realms

1.0 Introduction

This chapter defines the three research realms discussed in the introduction, by placing them in the context of wider research and the existing literature. These realms are used to frame what could be described as divergent issues relating to the construction industry, issues that are synthesised through this research in terms of experience, learning, and transformation. Chapter 1 places the research within these redrawn theoretical boundaries, using the current literature to identify gaps in existing knowledge and explore the significance of the research aims. The three realms are each discussed in turn, and within each realm the context and of this research is explored.

1.1 Defining environmental responsibility

If today is a typical day on planet earth, we will lose 116 square miles of rain forest [...] another 72 square miles to encroaching deserts [...] 40 to 50 species [...] the human population will increase by 250,000 [...] today we will add 2,700 tons of chloro-fluorocarbons and 15 million tons of carbon dioxide to the atmosphere. (Orr 2004:7)

This section maps out an approach to environmental responsibility in terms of my definition, as ***being accountable for one's actions that in turn affect the conditions under which life is developed***. At the same time it brings into focus global and national strategies for reducing anthropogenic impacts on the environment, encompassing notions of environmentalism in terms of what Orr refers to as being a “good member” of the “land community” (2004:210). Guy and Moore (2007) define the difficulties of what constitutes environmentalism, calling for further research to identify those with most influence over decision-making to enable the provision of more sustainable lifestyles. This section brings together arguments for a sustainable society, and focuses on historic as well as future facing approaches towards our environmental responsibility.

1.1.1 A brief history of environmentalism

Our awareness of human interactions with nature are rooted in history; through the wilderness movement and the founding of the Sierra Club³ by John Muir in 1882, to present day environmentalism. Thirteen years after the publication of Aldo Leopold's ([1949] 1968) seminal text, *A Sand County Almanac*, in which he posited a deep ecological view of conservation, came Rachel Carson's *Silent Spring* (1962). Facing hostile resistance from industry at the time it sparked the second wave of environmentalism. The decade after her ground-breaking text saw a shift to a new paradigm⁴ (Kuhn 1970:81), the writing and research of the early 1970s manifested in a programme of social action, encapsulating ecological issues as well as new approaches to living and learning (Jamison 2010). This new paradigm witnessed the formation of significant global campaigning organisations including Friends of the Earth in 1969, and Greenpeace in 1971. As well as the rise in environmental action, the 1970s were politically very focused on energy provision. Two oil crises in the US, in 1973 and 1976, combined with political actions in the UK to bring a shortened working week. Experiments in low impact, low energy, off grid living, saw the Centre for Alternative Technology established in Wales in 1974 and the Rocky Mountain Institute in Colorado in 1982. These environmental movements were concerned with equity, preservation of the natural world, its resources and our place *within* that system rather than *without* it (Freire [1974] 2008:3), where we see our place as part of the world whilst able to change it by acting upon it, what Jamison (2010:75) refers to as a “cognitive praxis”. Issues of environmentalism were embedded in these new communities, echoing Moore (2010:9) when he argues that “unsustainability is not a scientific or technological problem it is a social one”.

There terminology developed away from environmentalism towards addressing issues of sustainability. The concept of sustainable development is largely attributed to the United Nations World Commission on Environment and Development, one sentence in particular from the report has become ubiquitous as the definition of sustainability⁵ (WCED 1987:93). The report contains further guidance that warns of compartmentalising the problems into environmental, developmental, and energy

³ Founded originally to protect the boundaries of Yosemite Park the Sierra Club is one of the largest USA environmental organisations.

⁴ The entire constellation of beliefs, values, techniques and so on shared by the members of a given community.

⁵ The oft quoted definition from the report reads “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

crises, as had been the case in the immediate preceding decades. The 'three legged stool' or 'triple bottom line' model of sustainability, encapsulating economic, ecological, and social realms, has been widely adopted and the marking out of these as three elements that make up sustainability, usually seen in the form of a Venn diagram, is prolific. The word sustainability itself has moved into everyday parlance, even if the more detailed, subtle, and conflicting concepts behind it may not have.

The end of the twentieth century witnessed has been described as the third wave of environmentalism. The debate still rested on notions of the 'natural' world and focused increasingly on carbon emissions and energy issues, rather than preserving habitat or species. During the 1990s attention turned to global warming and specifically the threat of climate change⁶. As we moved into the first decade of the twenty-first century, this 'third wave' manifested in direct action groups. Notably in the UK groups such as Camp for Climate Action enacted high profile protests specifically focusing on emissions related to the burning of fossil fuels. Internationally, the Occupy movement mobilised against wider environmental impacts, including social and economic injustice. Other organisations looked beyond the impacts of anthropogenic actions towards adaptation and resilience, to climate change, issues that have gained more traction in terms of the resilience of our constructed environment to cope with disasters (Wamsler 2014). The Transition Town movement, founded in Totnes, UK (Hopkins 2008) grew in the eight years from its founding in 2006 with one project to become a global initiative with over 477 participating communities by 2014 (*Transition Network* 2013). These local transition groups, and their membership, could be described as “deep-green”, showing a deep and profound commitment to environmental action and change. This division of the environmental movement into various shades of green, or a bifurcating of environmentalism along technical and non-technical lines, with the use of terminology such as eco-tech, is potentially limiting and damaging to the wider concern and our ability for collective action (Jamison 2001).

Much of the environmental debate in the early twenty-first century has been focused

⁶ In the sense of a threat to the survival of human centred activity. A critique of this anthropocentric view posits that planet earth and some species will survive climatic changes, human activity will not.

on atmospheric concentrations of carbon dioxide, with the Intergovernmental Panel on Climate Change (IPCC) publishing several assessment reports documenting the impacts and sources of greenhouse gas emissions (GHG) (IPCC 2007, 2013). Global weather events over the past decade have left neighbourhoods, cities and whole countries devastated, whilst local flooding in the UK appears to be a reoccurring event. Communities and international organisations can respond to immediate needs, but there is also a need to look longer term and in particular examine the sustainability of our built environment (Girardet 2008). The climate change summit, held in Copenhagen in 2009 (UNFCCC 2014a), failed to provide the long awaited global commitment that was anticipated, a commitment required for climate stability on an international scale (IPCC 2013). Subsequent summits have also fallen short of producing a global political solution and there remained little hope of this happening at the climate summit in New York in 2014, held in preparation for the COP21⁷ global climate agreement in Paris in 2015, established through the United Nations Framework Convention on Climate Change (UNFCCC) (UN 2014). Following the Kyoto Protocol⁸ in 2005, which embedded a phased approach to an 80% reduction on 1990 levels of CO₂ emissions by 2050, COP21 is potentially significant as 195 countries reached agreement on a binding climate deal, although ratification of the agreement reached across the delegate countries has yet to be fully realised (UNFCCC 2015).

1.1.2 An outline of an ethical approach

An ethic may be regarded as a mode of guidance for meeting ecological situations so new or intricate, or involving such deferred reactions, that the path of social expediency is not discernible to the average individual. Animal instincts are modes of guidance for the individual in meeting such situations. Ethics are possibly a kind of community instinct in-the-making (Leopold [1949] 1968:203).

Leopold's hopes, expressed above, have yet to be realised. The question as to whether humans collectively have an inalienable right to burn fossil fuel and participate in related activities requires an answer, and inevitably leads to a

⁷ The twenty first meeting of the Conference of the Parties, the group of countries who ratified the 1992 United Nations Framework Convention on climate Change (UNFCCC) at the Earth Summit in Rio de Janeiro UNFCCC. 2015. *The Paris Agreement*. [online]. Available at: http://unfccc.int/paris_agreement/items/9485.php [Accessed: 10th September 2016].

⁸ The Kyoto Protocol is an international agreement that commits its participants to internationally binding emissions reduction targets through the UNFCCC

discussion based in ethics. An anthropocentric view of the environment could tend towards an answer of yes we do, a biocentric or ecocentric view would present against. The human right to life, and debated right to fossil fuel burning, compromises nearly all other life on the planet. This is a debate too complex to conclude within this thesis, however some of the peripheral issues need to be explored as they are revisited in later chapters and have a bearing on the broader discussion of environmental ethics and values.

A key concept behind environmental ethics is the notion of rights to life, and more specifically the rights to life of all sentient creatures and all life beyond sentient creatures, considered within the ethical dimensions of the wider environment (Fox 2000; Singer 2011). The three main approaches to normative ethics are; deontological ethics, virtue ethics and consequentialism or consequentialist ethics. Deontology, deriving from the Greek for duty, is concerned with the moral judgement of the act; being pure, brave or selfless, for example; the moral principles we are duty bound to act under. Virtue ethics is concerned with the moral judgement of the person, the qualities of character, which could equally be pure, brave or selfless. Consequentialism is concerned with the outcomes and whether they are life enhancing. Fox (2009b:3) defines normative ethics as concerned with the “values we should live by”, and argues for a definition that is neither too broad or too narrow. A definition that is able to go beyond a rigid interpretation relating to how our behaviour affects others, which is often interpreted as *other people*, to one that encapsulates behaviour towards all others; meaning all other sentient beings. Fox (2009b:7) goes on to say that “the built environment generally, represents a significant challenge for both conventional anthropocentric approaches to ethics and more recent, non-anthropocentric approaches”, adding:

our most informed and considered views suggest that the biophysical realm – or “nature” in general – constitutes the overarching context of (and is therefore ultimately more important than) the human social realm and that the latter constitutes the overarching context of (and is therefore ultimately more important than) the human constructed realm (Fox 2009b:16)

By accepting Fox's definition, and a call for ethical thought to extend beyond the human to include the non-human environment, the ethical issues that the built environment raise come sharply into focus.

The development or acquisition of values can be mapped from Aristotle's notion of virtue, through the taxonomies of educational objectives developed by Bloom and Krathwohl (1964), to more recent research on environmental ethics and values (du Plessis 2013; Marshall 2014). Values and ethics have been considered throughout history and throughout education, the role of which, it is argued, is to encourage consideration of moral philosophy and ecology (Hostetler 2011; Jones et al. 2012). The etymological route of the word education is to “bring up” or “bring forth”, or a “leading-out” as Kegan (2009:42) describes. Concern about the future, and our place in that future, are universally experienced, feelings of responsibility for environmental problems forming part of an existential anxiety. An answer to this is proposed by Hostetler (2011), who recommends living a more philosophical life, focusing on education and well-being he advocates change, and suggests that education is the route for that change or transcendence, when he writes:

Transformation is transcendence, lifting the level of one's self. What greater opportunity is there for doing that than education, people being together in joyfully experiencing universal questions of the human condition? (Hostetler 2011:200)

Hostetler's quote above brings together the relationship between values, ethics, and education. The relationship between values and environmental behaviours has been much researched, an important question being “whether the different value bases for environmental concern translate into action when activated” (Schultz et al. 2005:460), Schultz et al. go on to state that:

self-transcendence is activated by a general awareness of harmful consequences resulting from environmental problems and a feeling of responsibility for these problems (Schultz et al. 2005:460)

Encouraging debate around environmental issues and communicating our environmental predicament has preoccupied activists, researchers, and campaigners for many years (Marshall 2014). Attempts to silence environmental activist groups has been well documented over the past decades (Jamison 2010). The question of how to engage people not only in dialogue about our environmental impacts but also engage in ethical debate and action, in the form of behaviour change, remains ongoing. Hillman (2004) has argued that our predicament is so catastrophic we need to re-evaluate what scares us more; losing our way of life, or

losing the planet. He has long promoted a top down approach to change, calling for carbon emissions to be controlled through international governmental intervention, as individuals en masse are incapable of coming to the 'right' decision independently - which for Hillman is to not fly, not drive and to reduce our energy demands drastically (Hillman 2014).

Communicating the need for environmental responsibility is more complex than scaring people into action, and actually just trying to scare people is not successful in eliciting behaviour change, in some circumstances it can have the opposite effect (Maio et al. 2001; Marshall 2014). Neither does encouraging people through other methods, perhaps economic, have a positive impact on pro-environmental behaviours. Evans et al. (2013) found that self-transcending reasons for behaviour change are salient in encouraging a spill-over from one environmental action to another, in their research they were studying the environmental actions of recycling and car-pooling. This becomes significant in my research where environmental behaviour on one project has the potential to spill-over into another, or where one environmental measure is introduced on a project, other measures may be more readily accepted.

Environmentally responsible building is often viewed as a middle-class indulgence, which begins to suggest an imbalance in environmental justice or action. This is supported by research on inter-cultural differences and pro-environmental behaviours, as Robinson et al. (2013) found in their study into household waste. However, although differences exist, research as to whether environmental behaviour belongs in the domain of those who can afford it remains inconclusive (Schultz et al. 2005). Schultz and Zelezny confirmed in their study across 14 countries, “two people could be equally concerned about environmental issues, but for fundamentally different reasons” (Schultz and Zelezny 1999:255). This goes beyond cultural concerns to address each individuals ethical concerns regarding the environment. The need to change perspective, to transform society and ourselves and to engage in extending our thinking regarding environmental issues beyond the here and now, is captured in this quote from Meadows:

Humanity cannot triumph in the adventure of reducing the human footprint to a sustainable level if that adventure is not undertaken in a spirit of global partnership. Collapse cannot be avoided if

people do not learn to view themselves and others as part of one integrated global society. Both will require compassion, not only with the here and now, but with the distant and future as well. Humanity must learn to love the idea of leaving future generations a living planet (Meadows et al. 2005:282).

1.1.3 Values and environment

Orr (2007) has argued for greater connection to environmental learning within built environment disciplines, and whilst there are individual actions, courses, and buildings addressing the environmental imperative these have been slow to filter through to the mainstream. Exploring value creation has historically sat within the territory of education, and exploring values within the built environment professions has tended to focus on education and development of values within students rather than the built environment professions (Bradley et al. 2010; Murray and Murray 2007; Nobe 2007). Where values and ethics have been researched this has orientated towards existing professional codes of conduct and how these might be developed (Bordass and Leaman 2012; Hill et al. 2012; Mason 2009). As Atkinson (2010:275) proposes:

[...] our engagement with the built environment is as primal and continuous as our engagement with the spoken word. It is integral with our physical and social existence. It is always there, an essential component of our 'being' in the world.

Atkinson places an importance on the relationship between built environmental and social context, and although here he is focusing on the role of architectural education there is a wider relevance to all built environment professions, and the interaction between responsibility and practice. This research pushes that exploration towards the individual practitioner and their values, to examine how professional experience influences behaviour beyond a professional code or professional education.

Although the relationship and interplay between professional practice in the built environment and values has been addressed more recently, the wider debate has moved on very little (Murray 2010). There remains a gap in the understanding of the relationship between normative values and the evidence of those normative values in our constructed built environment, particularly when addressing wider environmental concerns of energy consumption and material use (Owen and

Mitchell 2015). Murray (2007) and Holmes et al. (2011) explore value creation through cognitive positioning exercises, creating lists and groups of normative values, with Murray's work particularly focusing on built environment students and professionals (Murray 2010). Whilst normative values are evident in their research around environmental behaviours, the question of how values impact professional behaviours and actions remains. Marshall (2007) argues that people need to be engaged with the debate and feel that their actions will have an impact and are achievable, and that their intrinsic values have positive and lasting benefits (Holmes et al. 2011). This is a poignant issue for those involved in the construction industry, where buildings have lasting impact but where individual actions may not feel achievable. As O'Hara (2003:66) clearly identifies, we have not yet considered the "psychological and educational science and practice" that will be required in the future to address and meet the challenges facing humanity. These future challenges clearly sit within the realm of the built environment and our construction of it.

The construction industry is not unique in that it involves complex processes, the uniqueness of the industry is in the work, as it manifests in physical objects that are inhabited and occupied. An integral part of our environment, these objects we call buildings form spaces to live, work, and learn, and will hopefully stand for several decades. The perception of these places and our interaction with them is more complex than the physical construction. Fox (2009a:388-389) develops six architectural ethics which are concerned with; (1) basic forms of professional conduct, (2) physical impact of the product of architectural practice, (3) psychological impact of the building upon people who have direct contact with it, (4) "cultural fit" or "symbolic resonance", a building could be experienced as inspiring and enlivening were it not for its offensive cultural or symbolic resonances, (5) physical impact upon the environment, (6) "design fit", the extent to which a building fits with its natural, social and built contexts when considered purely in terms of its design rather than actual physical impact. These ethical issues are further explored through our relationships with place and how this impacts behaviour, through theories of place attachment. Carrus et al. (2014) specifically examine this through their review of research into attachment to place and pro-environmental behaviours, concluding that those individuals attached to place are more likely to protect that place in terms of its environment. Although pro-environmental behaviour is not

always enacted if it is perceived as a threat to economic well-being. Batel and Devine-Wright (2015) found similar complexities in the relationships between environmental impact and place attachment, in their research on responses to renewable energy technologies.

These concepts are complex, the key issue of relevance for my research is the relationships we form with our built environment as individuals, and how this influences our actions; in particular how that orientates an environmentally responsive approach to place. The resonance here is through the exploration of the actions and experiences of those constructing future places; schools, homes, and places of work, and that the construction of these places has impacts beyond energy and materials. Increasingly the global population lives in urbanised settlements (UNDESA 2015), and we spend increasingly longer amounts of time inside buildings; ensuring the quality, responsiveness, and responsibility of the built environment becomes increasingly vital, where the built environment is a sustaining environment. As, Seamon states:

Place attachment is part of a broader live synergy in which the various human and environmental dimensions of place reciprocally impel and sustain each other (Seamon 2014:12).

An ethical and environmental interplay is thus largely played out in constructed space, which places the emphasis on the built environment to evolve and change in response to wider ethical and environmental concerns. The following section defines the built environment in terms of the research, identifying current challenges, and future directions in responding to these impacts.

1.2 Defining the built environment

It is easy to see how much harm human activities do to the world [...] poisoned groundwater, radioactive waste, food and health scares, dying forests, dead seas and collapsing ecology [...] this isn't just what other people do. It is a product and by-product of the way we build and live (Day 2004:37).

As Day highlights above, the environmental predicament, discussed in the the previous section, and our response to it, is largely the by-product of the way we build and live. It is the built environment that we are concerned with here and

defining that in terms of impact, how it is regulated, and the changes required in order for the built environment to be more environmentally responsive. The built environment includes the construction and operation of buildings and the associated built infrastructure. Although my research focuses on four building projects, this section explores the entirety of the built environment and its associated impacts.

Post Latham and Egan⁹ the industry could be seen to have transformed, but change has been slow and has not been as conclusive or as wide reaching as required. As the Farrell Review (Farrell 2014) highlights there is still a lot of work to be done in engaging all built environment professionals in design, and all of the community in the processes of place making. Emphasising the importance of our built environment in our wellbeing, Farrell closes the review with this summary:

In the last few decades our food and our health have been transformed and we now expect and demand so much more, such higher standards. Our built environment, our buildings and places are just as critical to our happiness and wellbeing. What is facing us is how to raise this part of our culture to similar levels (Farrell 2014:191)

There are several pressures exerting on the construction industry; more stringent legislation, increased economic uncertainty, climate change, flooding, fuel pricing, energy efficiency, and finite resources to name a few. All these have implications for a rapid paradigm shift in order to respond to the environmental imperative, raising the question of how a progressive, forward moving, engagement in environmental issues might occur. Research suggests this could happen in a number of ways; through value reorientations, as du Plessis (2013) explores, through re-engaging with environmental values during formal education (Nobe 2007) or through a more general global paradigm shift (Meadows et al. 2005; Orr 2007). Practitioners and theorists have argued for development to act in harmony with the *natural* world (Alexander 1979; Day 2004; Roszak 1993) rather than be seen to be apart from it, as the human constructed world is made the natural world, so is inevitably part of it.

1.2.1 Impacts and policy

The construction industry has been identified globally for its significant role in

⁹ Government commissioned reports published in 1994 and 1998 respectively and viewed as key turning points in the drive for greater efficiency within the construction industry.

energy consumption, resource use, and waste generation (Vale and Vale 2013). The built environment requires vast resources, in 2010:

the world's buildings accounted for 32% of global final energy use and 19% of all greenhouse gas (GHG) emissions. Under business-as-usual projections, use of energy in buildings globally could double or even triple by 2050 (Chalmers 2014:4)

This compares to figures from the IPCC in 2007 that stated the built environment was responsible for 50% of anthropogenic GHG emissions (IPCC 2007), and approximately a third of global water consumption. The tendency to focus on carbon emissions and climate change is obviously important in the wider environmental debate (Hillman and Fawcett 2004; Marshall 2014; Urban and Nordensvärd 2013) but the industry also has a huge impact on environmental degradation associated with mineral extraction, waste generation, and waste disposal. If a business as usual (BAU) approach towards construction of our built environment is maintained the impact can only be expected to worsen as the predicted global increase in the industry of 70% by 2025 starts to take hold (Betts et al. 2013). As Bordass and Leaman are reported as saying “the world isn’t doing what it ought to be doing” (Pelly and Hartman 2013). The notion that we ought to be doing something about this global problem refers back to ethical issues raised in section 1.1 when trying to define an approach to environmental responsibility. Fox (2009b) expands this concept, by placing the problem in a wider philosophical and ethical framework, entreating that:

we should be asking ethically framed questions of the human-constructed realm in general and architecture and the built environment in particular (Fox 2009b:8)

After the Kyoto Protocol in 2005, the UK passed the Climate Change Act (CCA) in 2008, which embedded a phased approach to an 80% reduction on 1990 levels of CO₂ emissions by 2050. As leading consultancy ARUP have highlighted, legislation concerning energy and emissions is difficult to keep up with (ARUP 2013), intermediate targets of 10% reduction by 2010 and 35% by 2020 have been established along with various unsuccessful government strategies to achieve these, the most recent being the Energy Companies Obligation (ECO)¹⁰, and the

¹⁰ Energy Companies Obligation launched in 2012, to be reviewed in 2017.

Green Deal¹¹ introduced by the coalition government in 2012. Evidence suggests that neither of these incentive schemes were as widely adopted as at first predicted. Reporting of the Green Deal uptake suggested that out of the 20,000 applications that were expected by November 2013 only 219 had actually been fully processed and installed (DECC 2013). This lack of take-up led to the government withdrawing support in 2015.

Towards the end of the last century much of the debate around environmental performance of buildings related to energy efficiency and conservation; with new legislation addressing new build projects. The debate moved on, as did legislation, with the principles of the Code for Sustainable Homes (CSH)¹² now embedded into the revisions to part L¹³ of the building regulations (HMGovernment 2014). More recently the emphasis has shifted from new buildings to refurbishment of existing and a focus on energy conservation, with projects such as Retrofit for the Future (TSB 2014). There have been a number of changes within the industry through regulation, particularly in the areas of energy efficiency, water use, and waste. The European Energy Performance in Buildings Directive (EPBD), recast in 2010, and UK legislation have increasingly demanded lower energy consumption and more stringent carbon emissions targets through improved building performance (*Part L 2013 changes* 2014). Alongside these regulatory changes, various building performance assessment methods and standards such as the Building Research Establishment Environmental Assessment Method¹⁴ (BREEAM) (BRE 2014), the Association of Environmentally Conscious Builders (AECB) Gold and Silver standard, and the Passivhaus standard¹⁵ have been adopted either voluntarily or by

¹¹ Green Deal - launched in January 2013, was a financing mechanism to enable individuals to implement energy efficiency improvements in their homes through their energy bills. Funding of the scheme was withdrawn in 2015.

¹² The CSH was an assessment method for rating the performance of new homes - it was a Government owned national standard, it was withdrawn in 2015 following the Housing Standards Review.

¹³ Part L of the Building Regulations cover the conservation of fuel and power in domestic and non-domestic buildings.

¹⁴ Building Research Establishment Environmental Assessment Method is a tool for calculating building performance. Credits are given for various aspects rated against performance targets and benchmarks, buildings are rated in six categories, from unclassified to outstanding.

¹⁵ Passivhaus buildings provide a high level of occupant comfort whilst using very little energy for heating and cooling. They are built to the principles developed by Prof. Dr Wolfgang Feist and the Passivhaus Institute, Germany. Buildings can be certified as Passivhaus through a quality assurance process.

informing government departmental or regional strategies. For example, in the UK all new government buildings are required to meet BREEAM 'excellent' and the NHS require all refurbished buildings to meet an assessment target of 'very good' (BRE 2014). The plethora of governmental reports does not bring clarity for the industry, an internet search on 20th May 2014 found 7,764 reports on www.gov.uk referring to sustainability, with 1,134 specifically referring to sustainable construction.

The Zero Carbon Hub (*Zero Carbon Policy* 2014), explains the approach to zero carbon, where building fabric energy loss is tackled first, followed by provision of on site low carbon heat and power, and finally allowable solutions¹⁶ are used in order to meet the zero carbon definition¹⁷. Embodied energy and embodied carbon are becoming more significant as a percentage of total building energy use calculations as energy in use is driven down. Policies to ensure a building's fabric performance are significant if all new homes are to mitigate carbon emissions by 2016, new public sector buildings by 2018, by 2020 *all* new buildings are to be nearly zero carbon, and by 2030 all new buildings to be total life zero carbon (*Zero Carbon Policy* 2014), although governmental commitment to these policies is increasingly questionable. Zero carbon buildings have the potential to address wider environmental concerns of energy security and fuel poverty, although this latter issue is more keenly felt in the existing housing stock (Boardman 2010).

As well as an increased demand from regulation there has been a gradual growth in public awareness. Eco-bling is becoming increasingly disparaged and questioned within the industry as a way of resolving energy consumption and CO₂ emissions (Jha 2010). The move towards zero carbon goes some way to address this although the introduction of the allowable solutions mechanism has been criticized for weakening the aim and lessening the demand placed on developers to comply with zero carbon ambitions. Volume house-builders are beginning to address social sustainability through monitoring health and well-being (Bradley et al. 2010), as well

¹⁶ Off site solutions can be used if the zero carbon targets can not be met on site, the allowable solutions mechanism has been criticized for weakening the aim of zero carbon targets and lessening the demand placed on developers to comply with zero carbon ambitions.

¹⁷ Requires mitigation of carbon emissions produced on-site through regulated energy use, emissions from cooking, 'plug-in' appliances are not included as part of this policy.

as energy use; moving away from the focus on energy conservation alone as a measure of environmental impact (Bell 2013). Passivhaus standards have become more widely understood within construction with approximately 250 certified projects in the UK (up to the end of 2013), compared to a global figure of over 37,000 (*Passivhaus Trust* 2014).

Government policy on domestic energy incentives appears to be heading in a direction that is moving away from environmental regulation. With the withdrawal of funding for the Green Deal, and the setting of a clear intention to “wind down the code [for sustainable homes]” in the Housing Standards Review in 2014 (DCLG 2014), which proposed measures to streamline the processes of planning and building control so as to ease the administrative and assessment burden placed on house building. The intention to allow market forces to dictate future environmental direction within the sector through Energy Performance Certificates (EPCs) has been likened to the well known white goods labelling scheme¹⁸. It is now common place to see EPCs on estate agent details and Display Energy Certificates (DECs) in public buildings. As households spend increasingly larger percentages of their income on heating (Moore 2012), we may witness a demand for increasingly energy efficient housing, occupiers wanting to live in an 'A' rated home rather than an 'E' rated one. However if fuel prices are pushed down, as witnessed towards the end of 2014, then the urgency for energy efficiency may diminish. The impact of Government planning policy is also unknown. Although the National Planning Policy Framework (NPPF), introduced in 2012, argues for “a presumption in favour of sustainable development” (DCLG 2012:4), this remains ill-defined and the detractors of planning reform view it as a green-light for over development. The impact of planning reform is as yet unknown as neighbourhood development plans are still in their infancy.

The feed-in tariff (FiT) designed to encourage small scale production of electricity from renewable sources, such as photovoltaic (PV) cells, small scale wind, hydro, and combined heat and power, was introduced in 2010. The ambitions of the scheme were wider reaching to encompass behaviour change, de-carbonising

¹⁸ The Governments commitment to the abolition of the CSH and commitment to allowing market forces to dictate the future agenda was commented on by Andrew Stunell MP at the ASBP conference at University College London in October 2013

electricity, and empowerment for the community. The FiT rate has been adjusted year on year as the scheme and tariff were amended in-line with costs. Whilst the overall outcomes of the scheme remain close to the original government aim the adjustments to the payments and qualifying scales of installation, particularly favouring PV, have caused confusion and lack of confidence in the market over the the first five years of operation (Nolden 2015). The renewable heat incentive (RHI), a scheme supporting renewable heat generation rather than electricity, launched in 2014 and continues to fund schemes in a bid to meet government targets for carbon reduction by 2020.

Issues of inconsistent performance, lack of dissemination, and limited adoption of good practice, combined with the recurrent critical debate around what is rewarded within architecture and construction (Hatherley 2014), form a vision of an industry that is lacking meaningful acknowledgement of the wider ethical implications of construction - an industry with plenty of scope for change. Despite increased regulation, new initiatives, and short lived governmental interventions, the industry makes slow progress towards demanding improved energy performance, and where this is demanded there cannot be assurance that it is delivered. Whilst design and construction targets are laudable, there is still an acknowledged performance gap between predicted performance at design stage and how the building actually performs post completion and occupation; suggesting that our built environment is much more profligate with energy than we calculate through design assessment methods alone. Increasingly the approach towards performance analysis of buildings is being revealed as problematic in terms of transforming the industry. Assessment, of relatively few projects, in terms of performance at design and occupation stage reveals a discrepancy (Bordass and Leaman 2012). The few exemplar projects, in terms of environmental responsibility, appear to have had little influence on the construction industry as a whole (Tofield 2012). The assessment and evaluation of buildings post completion is crucial, and is being more widely acknowledged within the industry through various means including a change in the Royal Institute of British Architects (RIBA) plan of work in 2007, and the Soft Landings¹⁹ initiative which requires the whole construction team to stay involved

¹⁹ Developed by the Usable Buildings Trust and BSRIA, Soft Landings is a method by which industry professionals remain involved with the building during commissioning and post occupation to ensure a smooth hand over, the ideal being that users understand the building they occupy, use it as intended, and that designers stay involved with, and learn

beyond practical completion of the building to ensure smoother hand-over and running of the building in the first year of use (Way and Bunn 2009).

The government ambition for all new housing is to be near to zero carbon by 2016 is commendable (*Zero Carbon Policy* 2014), however the path towards it remains obscured, if not almost obliterated. The predicted growth in the construction industry, coupled with existing poorly performing housing, make for difficulty in meeting the demands of the Kyoto Protocol (ARUP 2013; UNFCCC 2014b). Although figures vary between 60% and approximately 70%, there is consensus that the majority of buildings which will be occupied in 2050 have already been built (UNEP 2009:15). Highlighting the importance of retrofitting for energy efficiency across all sectors, as well as maintaining stringent low energy targets for new build projects.

This is the dilemma the industry was grappling with at the turn of the twenty-first century, defining and redefining the environmental problem as well as potentially fragmenting the built response in the guise of 'green' or 'eco' building. In the UK this manifested itself in a small number of built projects which addressed ecology, resource depletion, and community, such as the Greenwich peninsular development, BedZed, and the Hockerton housing project. These projects acted as an example for the industry - a physical example of a new paradigm in construction (Vale and Vale 2013).

1.2.2 Professional regulation and education

All built environment professions are regulated by their respective professional codes of conduct. Fulfilling a client brief is a clear moral obligation as well as a professional one. Till (2009:180) argues that within architecture, short term expediency is in conflict with long term responsibility. Meeting the demands of the wider community is secondary to meeting the needs of the client, and is reinforced by the wording contained within the professional code of conduct. Fox (2009b) takes this further and calls for a deeper questioning of design from all built environment professionals:

from any issues that arise post completion.

it increasingly seems to me that professionals of many kinds – including architects, designers, builders, and planners (and even otherwise retiring philosophers) – will need to adopt a more advocacy role in their professional lives. They/we need to be able to say: 'No, you should not want me to design this building (or this urban plan) in this way, and these are the reasons why. We need to work together to achieve a satisfactory outcome in the light of these reasons' – that sort of thing. This represents a transition in the way in which many of us – and I include myself – have seen and might like to see our professional roles (Fox 2009b:23).

Codes of practice and conduct, can act as moral guidance as well as setting out legal obligations in our professional role. They do not necessarily impact on the actions of individuals on a day-to-day basis, questioning where the ethical responsibility of the individual construction professional manifests itself. Poon and Hoxley (2010) raise an interesting debate through their research into moral theory and professional codes:

The reason for focusing on the code of practice is because it is the contract entered into by members of the professional body to ensure legally enforceable requirements for their behaviour. It indicates the acceptable behaviour of members towards both clients and the general public. Hence, the code of practice represents a public announcement of the ethical principles to be adopted by members of a profession (Poon and Hoxley 2010:8).

In their argument clients appear to be taken out of the professional landscape and are answerable by the professions rather than answerable as a profession to the wider community. An ethical code embedded in professional practice is still demanding a compliance, rather than manifesting a transformation. Spector (2001) argues that codes of conduct exist for clients, and leave the building users, wider community, and the rest of the natural environment unaddressed. These arguments focus mainly on social responsibility, moral judgement and environmental decision making in the context and reality of building.

Bordass and Leaman (2012) present a working draft of a very reasonable list for a new professionalism that could be adopted voluntarily by individuals until it becomes more embedded in professional practice:

Elements of a new professionalism

- 1 Be a steward of the community, its resources and the planet. Take a broad view
- 2 Do the right thing, beyond your obligation to whoever pays your fee
- 3 Develop trusting relationships, with open and honest collaboration
- 4 Bridge between design, project implementation and use. Concentrate on the outcomes.
- 5 Do not walk away. Provide follow-through and aftercare
- 6 Evaluate and reflect upon the performance in use of your work. Feed back the findings
- 7 Learn from your actions and admit your mistakes. Share your understanding openly
- 8 Bring together practice, industry, education, research and policy-making
- 9 Challenge assumptions and standards. Be honest about what you do not know
- 10 Understand contexts and constraints. Create lasting value. Keep options open for the future

(Bordass and Leaman 2012:6)

A criticism of this list is that those professionals who already have a commitment to an environmental agenda are probably already addressing the items on this list, and this is explored within the research in later chapter. In terms of ethical behaviour much of this list resonates with the existing ethical principles outlined by the Society of Construction Law's Statement of Ethical Principles as discussed by Mason (2009). The danger here is that the production of a ten point list, even if it remains voluntary, could be viewed as yet another tick box exercise by those who do not view the environmental impacts of the industry as a priority, and creating an additional burden for those who already feel pressured by assessment of one form or another. This list is partly laid down as a challenge to professional bodies, and it is within the professional body codes where a degree of embedding of these principles could be achieved, as Hill et al. note the Royal Institute of Chartered Surveyors describes:

one of the principal tasks of the surveyor as: securing the optimal use of land and its associated resources to meet social and economic needs (RICS 2008 cited in Hill et al. 2012:14)

The Institution of Structural Engineers refer to acting in the “public interest” (ISE 2015) but do not specifically mention environmental impact, in fact the word

environment does not appear as part of their code of conduct. The Institute of Civil Engineers (ICE) refer to the concept of public interest, claiming activity must be in the “public good”. There is a consideration of wider environmental impacts where they adopt the language of sustainability:

The duty upon members of the ICE to behave ethically is, in effect, the duty to behave honourably; in modern words, ‘to do the right thing’. [...] Members of the ICE should always be aware of their overriding responsibility to the public good [...] The ‘public good’ includes care and respect for humanity’s cultural, historical and archaeological heritage (and) to protect the health and well being of present and future generations and to show due regard for the environment and for the sustainable management of natural resources (ICE 2003 cited in Hill et al. 2012:14)

The Chartered Institute of Building Services Engineers (CIBSE), also has a code of conduct which states, members shall “have due regard to environmental issues in carrying out their professional duties” (CIBSE 2015). Whilst the Architects Registration Board (ARB) code of conduct (standard 5), states:

Whilst your primary responsibility is to your clients, you should take into account the environmental impact of your professional activities (ARB 2014)

Whilst the Royal Institute of British Architects (RIBA) code requires that “members should be aware of the environmental impact of their work” (RIBA 2005:5).

As a response to these somewhat disparate codes Mason (2009) highlights the need for a single unifying construction industry code. However, the construction industry contains a complex and fragmented group of professions (Hartenberger et al. 2012), and the lack of interaction, cross disciplinary working, and interdisciplinary learning within the built environment has come under criticism (Pooley 2015). Hill et al. (2012:17) state, it is “clear that responsibility for change lies with individuals, their professional bodies and within the wider society”, they draw on the work of Blake (1999 cited in Hill et al. 2012:17) to reach these conclusions, Blake having outlined three key barriers that hinder a shift in professional behaviour:

- individual barriers - to do with attitude and temperament
- responsibility barriers - an unwillingness to take responsibility or a perceived lack of influence
- practicality barriers – social and institutional constraints.

There are great demands placed on the construction industry; to provide new homes, new garden cities, a new London sky-line, and all with significant reductions in energy demand. Changes in UK legislation, as discussed in the previous section, are largely driven by European Directives (BRE 2014; *Part L 2013 changes* 2014), and have not delivered the changes within the industry at the pace required. The Construction 2025 (HMGovernment 2013a) report cites five main barriers that prevent innovation in the construction sector, which pick up similar points highlighted by Blake above, and the ten point list of Bordass and Leaman (2012:6). The five barriers being:

- restrictions of collaboration with the supply chain
- lack of confidence that innovation will pay
- lack of access to affordable finance and lack of visible Government support
- failure to capture learning and take this forward to future projects and
- 'patchy' collaboration between industry, academia and research organisations limits knowledge transfer (HMGovernment 2013a:61)

The report acknowledges that the industry is not good at sharing knowledge, capturing it and taking it forward, stating that “learning points from projects are often team-based and lost when the team breaks up and the project ends” (HMGovernment 2013a:23). Pultar (2000:157) suggests in his process model of building (see figure 4), that the industry is under pressure to respond to the forces exerted upon it at all stages, by both environmental factors and cultural factors, which require addressing through professional education. Pultar makes the link between ethical precepts and values explicit, what is less clear is the relationship between values and behaviours or action, as Schultz et al. found in their 2005 study across six countries “values and environmental concerns explained only a small amount of variance in environmental behaviors” (Schultz et al. 2005:417).

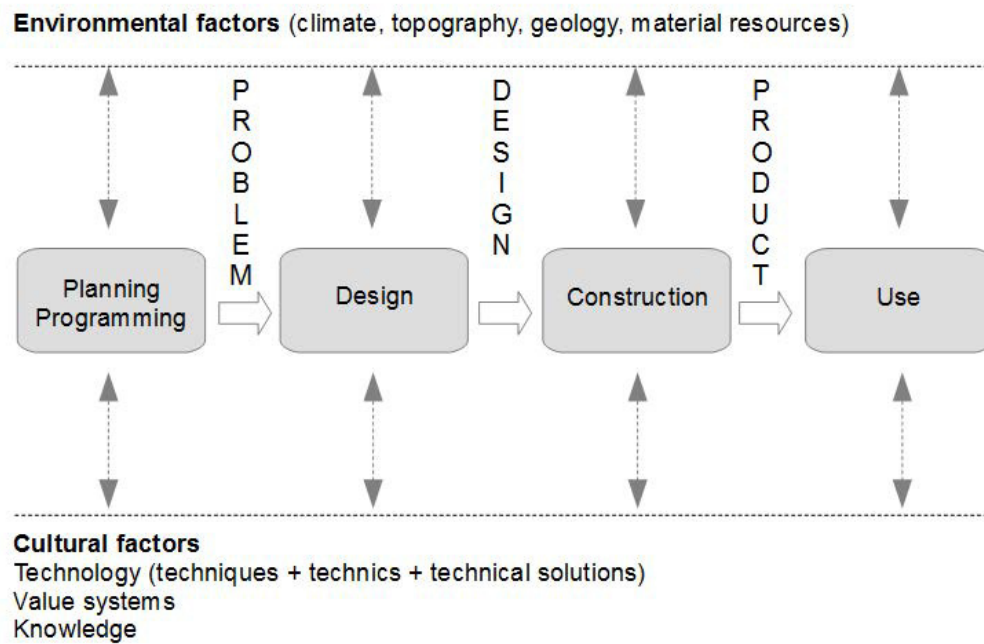


Figure 4. Process model of building after Pultar (Pultar 2000:157)

Continuing Professional Development (CPD) could be a useful mechanism for change if we accept the need to move the industry beyond addressing skills alone. As Altomonte (2010) found approaches to and knowledge of issues of environmental impact and sustainability vary within professions as well as across professions with the industry. This research focuses on four related professions within construction: architects, engineers, contractors, and clients, each profession's governing body has guidelines regarding delivery and completion of CPD. The RIBA for example demands that architects undertake at least thirty-five hours of CPD each year with twenty of those hours covering the ten topics in the core curriculum, one of those core topics being climate and sustainable design. This is dangerous on two counts: one, that 'sustainable' design is still being referred to and viewed as something other than an architecture of the everyday, and two, it is possible to only engage a learning activity orientated towards 'sustainable' design for two hours each year. The CIOB does not have a prescriptive curriculum, but does monitor CPD activities as a condition of membership.

Hartenberger et al. (2012) point to the need for leadership within the built environment and refer specifically to professional organisations as being critical in forwarding environmental attitudes within the industry as a whole. This of course

can start at university, as they suggest:

a number of new and adapted approaches, tools and methodologies that if broadly adopted by universities and other higher education institutions could help to shape a built environment professional identity to renew the thought leadership and authority of built environment professional organizations, especially in (and via) the field of sustainability which should be an integral part of practice and not an add-on (Hartenberger et al. 2012:72)

Hartenberger et al. argue for an interdisciplinary approach in higher education to foster “development of a shared cross-professional identity”; they go on to say that a narrowing of responsibility due to hierarchical thinking weakens the capability for solution and cooperation, and this in turn has an impact on building performance. The role of education and training is highlighted not just as it impacts the professions but as it impacts later stages (as discussed in section 1.1).

The education and training of built environment professionals needs to strengthen the understanding of the consequences of one’s own actions. These actions not only impact on society and the environment in general, but also on the specific objectives and scope of others at later stages in the value chain (Hartenberger et al. 2012:67).

Strategies indicating a way forward are often focused on training and skills (BERR 2008) and there is still a recognised gap in the skills and knowledge required by built-environment professionals to guide the construction industry through these challenges.

[...] the industry faces a pressing need for a capable workforce that can deliver transformational change in the next decade. As the wider economy emerges from the recession, construction firms must be able to recruit and retain skilled, hard-working people in sufficient numbers to meet the increasing demand for construction. We must also be able to recruit and develop people with new types of skills (HMGovernment 2013a:44).

Education focused on sustainability issues has evolved since the turn of the twenty-first century (UNESCO 2010). During the Decade of Education for Sustainable Development (UNESCO 2005) there was a lot of discussion about how to educate for sustainability but little evidence of how we do that within the construction industry (Pooley 2015). Higher education (HE) institutions particularly are increasingly encouraged to focus on developing sustainability literacy among their students (Sterling 2012). Orr (2007) argues for greater connection to environmental learning

within built environment disciplines, as a focus on skills alone neglects a values and ethics based approach to learning and professional practice. As Bradley et al. (2010) state there is a need “for the development of the attributes that contribute towards facilitation and empathetic practice”, rather than existing skills being redefined in terms of sustainability. Murray (2007) provides guidance on strategies for encouraging reflection and development of values orientated towards environmental responsibility by developing workshops that offer students an opportunity to reflect on environmental impacts and issues and so are particularly relevant for those intending to go into professions that shape our built environment. The connection between education for sustainable development (ESD) and the construction industry has been variously discussed and sits alongside a broader call to identify and analyse industry and business more generally, in terms of ESD (UNESCO 2010:44).

1.2.3 Technology and a changing industry

It could be argued that whilst engaging in moral and ethical discourse is necessary to understand behavioural change, discourse is redundant in the urgency to address environmental responsibility within the construction industry, as there is a technical solution to our predicament which could enact change faster than an ethical one. There has been ongoing debate within industry and the media regarding solutions to green house gas emissions, Monbiot (2013) in particular has been a high profile advocate of a nuclear, carbon free solutions to energy provision. Clean, low carbon technologies, including advanced waste incineration and carbon sequestration, have been offered up as potential solutions to reducing carbon emissions in line with Kyoto targets. Renewable technologies are posited as another fix, although it is widely acknowledged that none of these technologies provide a singular answer (MacKay 2009). Orr (2004) has argued that there is little evidence to suggest technical solutions to problems of energy consumption are free from their own associated energy demands and related emissions. Photovoltaic (PV) panels, wind turbines, heat pumps; all have associated energy demands in manufacture and additionally impact on local ecology and finite materials. Power generation through nuclear fission has associated waste, the processing and disposal of which is highly controversial. Nuclear fusion offers a potentially waste free solution, but is still many years away.

Exergy from solar radiation requires processing, all of which has associated inputs and outputs in the form of energy, the balance of which is critical in this debate, in terms of overall impact it is essential to look at the energy returned compared to the energy invested (ERoEI) of power generation. It is this energy balance that forms part of the dilemma in the industry, and in many ways is at the heart of an environmentally responsible approach to the built environment. Unless or until new technology can supply energy without associated consumption, the balance of energy returned on energy invested needs to be exceeded. Technology will no doubt form part of a 'sustainable' future, adaptation of existing technologies will take time and rapidly changing technologies, such as mobile communication devices and cloud storage, remain a relative unknown (Allen et al. 2010). My argument here is that a technological fix is possible but cannot be the only approach, much as legislation can only change behaviours superficially. To paraphrase Einstein - we cannot solve problems with the same thinking we used to create them – we cannot solve our energy and emissions problems without shifting our paradigm, and neither technical or regulatory fixes question a moral or ethical motivation.

The tension between economic development and environmental impact is ongoing. In the UK in 2014 there appeared to be a move away from long term environmental commitment towards a short term strategy based on a BAU approach; with shale gas exploration being given broader remits within the Queen's speech at the opening of Parliament in 2014. Funding of future airport expansion agreed in principle, along with a new nuclear power programme and high speed rail connection, all requiring a physical and energy infrastructure. Although in an increasingly uncertain political and economic landscape how many of these infrastructure projects will come to fruition or continue to be supported is unclear. An apparent commitment to invest in the energy and transport infrastructure, coupled with a call for a quarter of a million new homes per year (Griffith and Jefferys 2013) compounds the need for an environmentally responsible approach to our constructed environment. Demand in growth places pressure on an industry that is being called on, through increasing regulation and legislation, to drive down energy consumption and to move towards zero carbon targets; whilst also being called upon to provide growth in the economy through development of housing and

transport. Here lies a perplexity for the construction industry in terms of sustainable development. On the one hand it provides a sustainable solution in terms of economic growth, employment, and housing; whilst on the other the industry represents an unsustainable problem in terms of finite resource use, waste generation, energy consumption, and carbon emissions.

Construction professionals have to face this complexity of issues on each project, as each project differs in size, brief, ecological, and human context (Guy and Farmer 2000). A more recent technological response to this complexity, beyond the digitisation of the drawing process, is Building Information Modelling (BIM)²⁰. Heralded as a silver bullet in terms of information sharing and building management, BIM represents an opportunity for new routes in not only designing and constructing, but how we manage the built environment beyond construction, and is seen to be significant in terms of monitoring building performance (HMGovernment 2012). However, as Jaradat et al. (2013) found in their study the use of BIM can lead to interruption in existing working practices, and reducing professional autonomy. The research surrounding BIM is mainly concerned with application rather than implication in terms of professionalism, or learning. BIM therefore represents an opportunity to learn new skills, but how it develops new knowledge beyond compliance is yet to be fully understood or explored. Particularly unknown as yet is what may be lost in the process rather than what might be gained (Bordass and Leaman 2012). These issues are discussed in later chapters through the experiences of the research participants.

The Green Construction Board (*Low Carbon Routemap for the UK Built Environment* 2013) provide advice and a route map to a 'greener' industry, and emphasise the technical ability of the industry to reach carbon reduction targets, but as Zapata-Lancaster highlights in her research:

²⁰ BIM is a collaborative way of working, underpinned by digital technologies which unlock more efficient methods of designing, creating and maintaining assets. BIM embeds key product and asset data and a three dimensional computer model that can be used for effective management of information throughout a project life-cycle – from earliest concept through to operation HMGovernment. 2012. *Building information modelling* [online], Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34710/12-1327-building-information-modelling.pdf [Accessed: 2nd May 2015].

the pathway towards low carbon design is not only about imposing higher targets by the policy agenda or disseminating the low carbon information and regulatory updates. The mere acquisition of technical information is not sufficient for low carbon design (Zapata-Lancaster 2014:209)

Hence this research moves beyond acquisition of information (knowledge) and beyond the tools that Zapata-Lancaster was examining in her research (skills) to focus change through experience and reflection on practice.

What is less apparent in existing arguments is how we are to move beyond the notion of 'green' buildings towards assessing building performance in ways that capture their wider influence on wellbeing and happiness, and a secure environmental future. The report concludes on the need for training, education, and knowledge sharing, as previous industry reports have highlighted, and as we already know something the industry is not good at. The dissemination of good practice and exemplar projects is important, but does not comment on learning or transformation through individual experience, or recognise the potential significance of learning in this way.

This brings us back to the opening thoughts of this chapter, that of an ethical consideration of the rest of the natural environment, addressing learning and a moral positioning, as Guy and Farmer argue:

a social accounting of moral positions may help to make ethical analysis more practically significant and would also more closely coincide with the context of real-life building and environmental decision-making processes which engage with a wide range of building types, located within differing ecological and human settings (Guy and Farmer 2000:84)

The current unsustainable situation is a moral and social one, rather than a technological or scientific one (Moore 2010:9). We can wait for governments to regulate our carbon budget and behaviours through regulation, technological innovation and economic sanction, but we can also affect change through moral and social action. As McDonald et al. (1999) found in their research with vegans and Kovan and Dirkx (2003) found with environmental activists, there is a clear connection between ethical environmental actions and change in perspective. Whatever the motivation for action it is not enough to remain optimistic about environmental impacts being remedied through technological fixes, but to engage in

the debate and adopt a broader perspective or as Jamison (2001:36) argues, a pluralist sensibility. This brings us to the final section in this chapter and the third research realm, the role of learning.

1.3 Defining learning

If tinkering reforms are not an adequate response to our plight - and they are not - we must rethink our initial assumptions about learning and the goals of education (Orr 2004:41).

Theorising education has been an enduring human preoccupation, dating back to Socrates. This section focuses on learning theory as it relates to adult learning in a broad sense. Fundamental theoretical approaches to learning can be viewed as distinct territories, however the messy reality of learning as an adult is that no one theoretical approach fits any one situation at any one time. One of the six theories outlined in section 1.3.1 (see also appendix E), is experiential learning. Whilst this is listed as a separate approach to learning, experience per se is embedded as a key element in many approaches, and particularly in non-formal or informal learning. In this sense some theorists defy definition or categorisation, developing theories that both acknowledge the importance of experience, whilst also acknowledging that the experience is clearly situated. Illeris (2004, 2011) would be an example of one such learning theorist whose work predominantly focuses on workplace learning yet bridges theories of experiential learning and transformation theory. Section 1.3.2 relates specifically to learning as an adult, including learning at work and learning in non-formal and informal situations, recognising that learning takes place in many forms and throughout all stages of life. Whilst the boundaries of categorisation are not always as distinct as those between a behaviourist and humanist approach, it is still useful to examine key approaches briefly, in order to place transformation theory within its theoretical context.

This research is focused primarily on the the types of learning that take place as an adult, specifically exploring learning within professional practice and whether the learning is transformational within individual and professional practice, and how it might impact a wider community. As Jarvis states:

At the very least, learning is the transformation of our experiences of living so that they affect us as persons - in this sense they be-

come part of our biography - and so we can begin to see the parameters of learning (Jarvis 2010:39).

Figure 5 (over) starts to suggest how those influences could take place through the nesting of the individual within a wider community, and how a change within an individual biography could ripple out to influence the realms that are concentric around him or her, conforming to the theories that argue learning as a social process that takes place both between and within individuals.

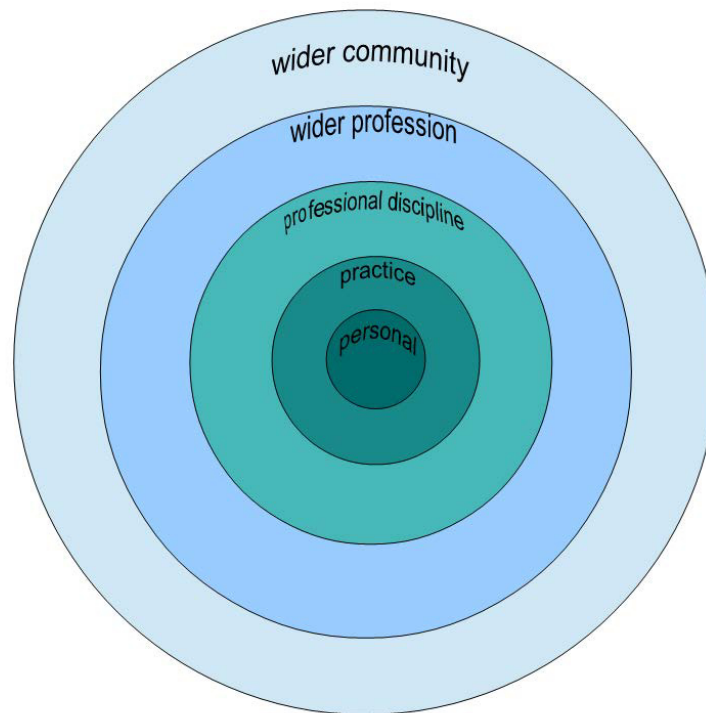


Figure 5. Change emanates from personal to wider community

Learning can be broadly defined as any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing (Illeris 2009b:7).

Illeris and Jarvis adopt different yet complimentary perspectives, the unifying point being that the process of learning is a social one. The complexity of defining learning and the processes of learning is captured by Fenwick (2010) when she describes the difficulties in the naming of learning, with different ontologies, different meanings, and in a different context.

The language we use to discuss a phenomenon [...] is deeply embedded in the ontology we inhabit. From within the methods, desires and instruments available to us in this ontology, and through our participation in the method assemblages of this ontology, particular phenomena materialise that we come to recognise and name as 'learning' (Fenwick 2010:90).

One of the key positions my research adopts is the view that learning is an opportunity for reflection, change, and transformation, and that learning takes place within the individual, through experience and situated in a social context. The relationship between environmental responsibility and learning is not tangential in this context but critical, as Blewitt acknowledges:

Sustainable development warrants an attitude of mind that welcomes change, difference, creativity, risk, uncertainty, a sense of wonder, and a desire and capacity to learn. It is a heuristic – a way of learning about life and through life. The importance of learning should never be forgotten. We can only grow, flourish and be sustainable if we learn (Blewitt 2015:2).

The following section outlines six key theories as they relate to learning more generally, with reference to adult learning theory specifically.

1.3.1 Learning theory: an overview

Adult learning theory has been well documented over several decades, so there is little need to reiterate the body of work contained in this wide territory. What is more useful is to map orientations towards adult learning and to establish key components around which later discussions will manifest. Learning is discussed within this research as part of a lifeworld, taking place over a lifespan; learning that is lifewide (Alheit 2009). Existing theories of adult learning are used to support the experiences explored within this research, rather than to develop new theories of learning. As Carlile and Jordan (2005) summarise there is “an increasing awareness of the role of philosophy and sociology in examining learning as a moral and a social activity which cannot be divorced from purpose, value and context”. The following summaries provide an overview of learning theory and can be read in conjunction with the learning theory matrix contained in appendix E.

Behaviourist

Behavioural approaches to learning were most notably developed by Skinner, and

most famously by Pavlov in his work in psychology and animal behaviour (Jarvis 2010). Behavioural theory argues that there is no such thing as free will, and that actions do not come from within but are more reactions to what is happening externally (Husén 2001:62). In more formal educational settings this type of learning is colloquially referred to as 'the sage on the stage' approach, where the educator arranges the room and the material to elicit a certain response, whilst learners are encouraged to receive the knowledge being imparted to them. Students learning by rote, do learn, but this is less likely to stay with them as Biggs (2003) discusses in his description of Marton and Säljö's theory of 'surface' and 'deep' learning (Marton and Säljö 1976 cited in Biggs 2003:12). The process of learning in behaviourist terms often involves surface learning, without reflection or experiential development.

Cognitivist

Cognitive theories of learning are underpinned by the work of Piaget (1971) and his early work on childhood development. Piaget's identified stages of learning end prior to adulthood, however his developmental theories of childhood have influenced many including the work of Kohlberg (1983), who sees moral theorising developing with age and is therefore more significant in an adult learning context, and the work of Kegan (1994, 2000) a constructive developmental psychologist, further discussed in section 1.3.2 as it relates specifically to learning as an adult.

Humanist

A humanist approach is most commonly associated with Rogers (1993), who explored the motivations behind being able or wanting to learn. Skinner advocated control of the learner, whereas Rogers' work comes out of a very clear humanist tradition of self direction and development, with the educator as facilitator rather than instructor. Knowles (1984) and Rogers place emphasis on the self and the need for self-development. Knowles' development of the concept of andragogy, learning specifically focused for adults, has been criticised for presenting a dichotomy within pedagogy, splitting approaches that should be considered as one (Davenport 1993).

Experiential

We understand a map best when we are able to draw it out for ourselves. The best way to understand is to do. That which we

learn most thoroughly, and remember the best, is what we have in a way taught ourselves. (Kant 1900:80)

The relationship between learning and experience has been explored by various theorists, although as Dewey ([1938] 1997:25) identified not all experience is “genuinely or equally educative”. The fundamental cycle of experience and learning is captured in the oft cited model by Kolb (1993:139) in what he refers to as the Lewinian Experiential Learning Model (see figure 6 below).

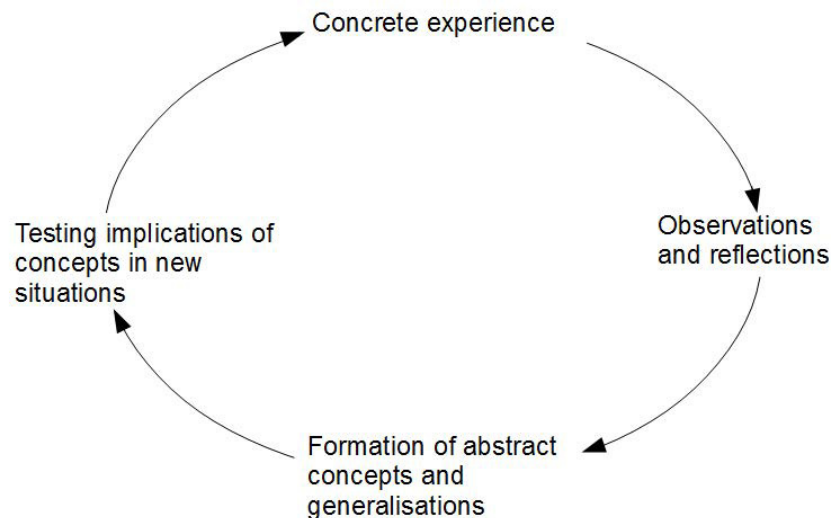


Figure 6. Lewinian Experiential Learning Model after Kolb (Kolb 1993:139)

Kolb emphasised a cyclical interpretation of the nature of experiential learning and offers a working definition of learning as “the process whereby knowledge is created through the transformation of experience” (Kolb 1993:155). It has been argued that the cyclical and changing nature of learning, particular as it relates to experience and reflection, cannot be described in this cyclical model as the progression in learning is not captured but repeated without being advanced (Moon 1999:138). Elkajer (2009:86) responds that Kolb's model is intuitively correct, and the “tacit knowledge derived from bodily actions” needs to be taken into account when talking about learning experiences; a key issue for learners in the construction industry. Illeris (2007) clearly sets out the difficulties in defining experiential learning, in particular the difficulties with Kolb's conclusion that all learning is experiential, in contrast to Dewey's position that it is the quality of the experience that is important. The theoretical underpinning of experiential learning complements the heuristic

nature of the construction industry and as such is examined through later chapters, and is revisited in section 1.3.2.

Situationist

Situationist learning is encapsulated in the work of Lave and Wenger (1991) building on the earlier work of Berger and Luckman (1979) in social construction theory. Situationist learning has primarily been developed through the theory of communities of practice (Wenger 1999). The emphasis is on learning as part of a whole life, intrinsic to life, and an inevitable part of it (Wenger 2009b). Communities of practice encompasses value creation, which is a critical issue within this research as it encompasses change in practice and process:

Adapting and applying knowledge capital in different contexts can lead to changes or innovations in actions, practice, tools, approaches, or organizational systems. Looking at applied value means identifying the ways practice has changed in the process of leveraging knowledge capital (Wenger et al. 2011:21).

The components of learning being; practice based, active, experiential, and within a community, where learning can lead, through a sense of belonging, to a greater sense of identity. There are parallels that can be drawn here with childhood attachment theory and the work of Ainsworth and Bowlby (Ainsworth 1978). In attachment theory a sense of security (attachment) can lead to more risk taking, creating greater opportunity for wider experience, and hence leading to more opportunities for learning. As one would expect the social aspect in situationist learning is critical; learning being a participatory social act (Jarvis 2009), shaping not only what we do but how we interpret what we do (Wenger 2009b).

Transformative

Transformation theory is rooted in the work of Mezirow (1991), and whilst there are shared concepts, it is important to draw a distinction between transformation as change, and transformational learning as a theoretical basis for perspective transformation, or as Mezirow (1991) describes it, a perspective transformation or changes in habits of mind.

Transformative learning, although used at times to refer to outcome, process, and/or pedagogy, is most aptly used to describe the intrapsychic and/or behavioral process of a learner involved in a transformative experience – it is about what the learner does, feels and experiences. Transformative learning as conceptualized in this way can and does occur through life experience itself, as

well as through formal or informal educational programmes (Fisher-Yoshida et al. 2009:7).

Reading the quote above it could be interpreted that transformational learning encompass all learning models. This is one of Kegan's (2009) concerns that transformation is misrepresenting learning, and that often learning can be based in information with just as much validity. As Kegan suggests “as the language of transformation is more widely assimilated, it risks losing its genuinely transformative potential” (Kegan 2009:41).

Transformative learning has become an increasingly wide subject area with many theoretical streams (Fisher-Yoshida et al. 2009); these are further discussed in section 1.3.3. King's definition of transformative learning offers to bridge these, as she defines learning that transforms and informs practice:

Transformative learning is the process of meaning-making that adults navigate as they critically reflect on their values, beliefs, and assumptions and consider fundamentally new orientations of understanding their world (King 2005:6).

This theoretical approach is threaded throughout the research, and revisited in later chapters. The tensions contained within transformation, as well as transformative learning theory, are expanded in section 1.3.3, where the concept of learning as transformation is explored in more depth.

1.3.2 Learning as an adult

the unfinished character of human beings and the transformational character of reality necessitate that education be an ongoing activity (Freire [1970] 1996:65)

This section focuses on the general concepts of learning as an adult, where actions outside of structured activities, such as work or college, can in turn inform structured activities thus exposing people to learning experiences that as Kegan (2009) defines are “off one curriculum” and in another. Thus referring to all the curriculum we follow throughout our lives, of mother, daughter, worker; rather than a formal curriculum experienced at school, college or university. Learning as an adult encompasses lifewide learning (non-formal and informal), as well as life-long learning (formal and non-formal). A continuous engagement in learning, through experience, is embedded as part of a lifeworld, part of the process of being human

and experiencing the world (Freire [1974] 2008).

Drawing on the European Commission communication on lifelong learning (2001), and the European centre for the development of vocational training (Cedefop 2000), Colardyn and Bjornavold (2004) provide us with a clear synthesised definition of the terms for formal, non-formal, and informal learning, which are summarised below:

Formal learning consists of learning that occurs within an organised and structured context (formal education, in-company training), and that is designed as learning [...] Formal learning is intentional from the learner's perspective.

Non-formal learning consists of learning embedded in planned activities that are not explicitly designated as learning, but which contain an important learning element. Non-formal learning is intentional from the learner's point of view.

Informal learning is defined as learning resulting from daily life activities related to work, family, or leisure. It is often referred to as experiential learning and can to a certain degree be understood as accidental learning [...] Typically, it does not lead to certification. Informal learning may be intentional but in most cases, it is non-intentional (or 'incidental'/random) (Colardyn and Bjornavold 2004:71)

The terminology adopted within this research aligns with the learning described above as 'informal'. Being largely concerned with learning that happens at work, within a family or leisure context, what is described as the taken for granted learning that happens lifewide (Clegg 2013). Illeris (2007) refers to informal when discussing experiential learning, as an informal learning by doing. Eraut (2000:114), dismisses the use of the term informal learning as overly colloquial and a "catch-all" label. He argues that whilst most learning does not take place in a formalised context, using the word informal to describe learning is too imprecise and confused by other uses of the word, to describe dress for instance. Eraut defines learning as "the process whereby knowledge is acquired. It also occurs when existing knowledge is used in a new context or in new combinations" and uses the term non-formal in contrast to formal learning. Eraut (2000:115) goes on to classify non-formal learning into typologies of implicit, reactive and deliberative learning intention.

Chao's (2009) summary of what constitutes an adult learner highlights key theorists in a comparative attempt to define motivations and barriers for adult learning. Whilst

motivations are significant in adult learning, the exploration of motivations for adults pursuing formal and non-formal learning routes is less critical here, as my research explores learning that is often incidental (informal) learning that takes place as part of the everyday.

The model below (see figure 6) starts to map potential journeys through learning; moving from 'surface' to 'deep' (Biggs 2003), from just doing the job on the left-hand through experience and reflection on values, to potential perspective transformation on the right-hand. This diagram can be read in conjunction with the learning matrix in appendix E.

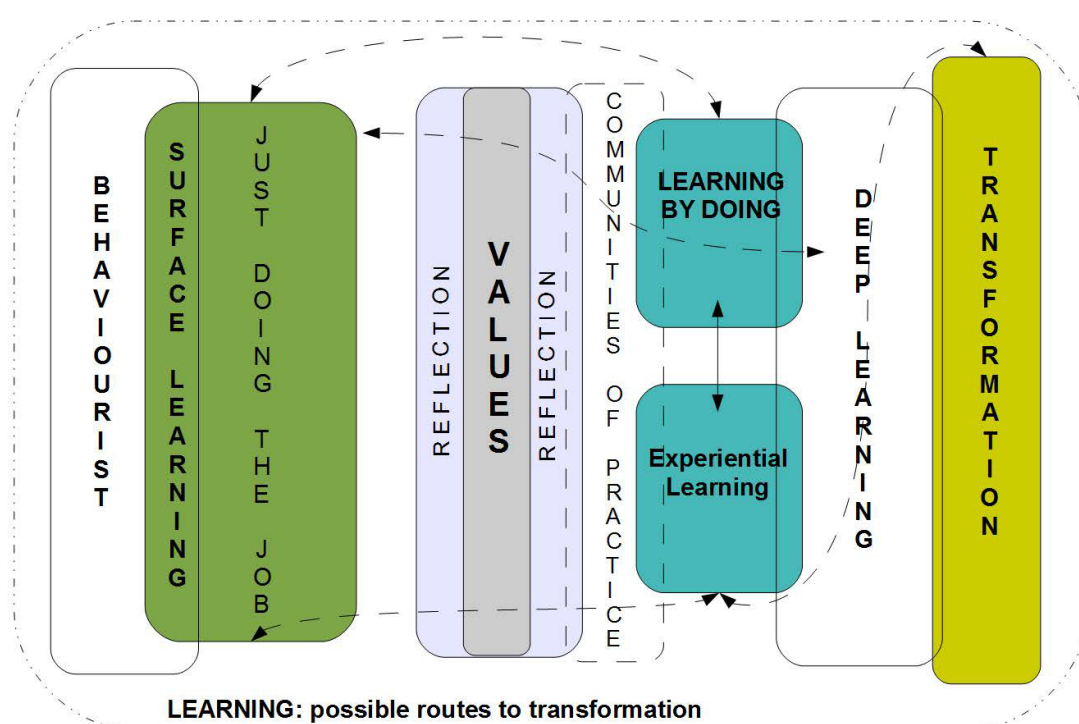


Figure 7. Possible routes through learning: from surface to deep to transformational

The possible routes through learning, indicated by dashed arrows, start to suggested not only the complexity of learning but how it can move from and through different experiences and realms.

Eraut (2000:116) identifies typologies of non-formal learning through three strands: implicit learning, reactive learning and deliberative learning; describing two distinct

processes, that of experiential learning, following Kolb's model, and the other of routinisation “whereby explicit procedural knowledge is converted to tacit knowledge through repetition” (Eraut 2000:124). Eraut (1994) suggests that, over someone’s life history, there may be periods of assimilation and periods of accommodation and reorganization. He goes on to describe different types of learning within a non-formal route of implicit, and explicit learning, with the introduction to Reber's (1993 cited in Eraut 2000:115) implicit and explicit introduce one further category deliberative learning to describe situations where the learning is explicit but takes place almost spontaneously in response to recent, current or imminent situations This reactive learning is near-spontaneous and unplanned, Its articulation in explicit form could also be difficult without setting aside time for more reflection and thus becoming deliberative (Eraut 2000:115)

Learning in the workplace has been extensively researched although it is not always clearly defined. Fenwick (2010) highlights issues around differing ontologies and not trying to make seamless what is not, when it comes to understanding workplace learning. “Those of us studying workplace learning are often witnessing the enactment of distinct phenomena in fundamentally different realities, that all are referred to as learning” (Fenwick 2010:90). Equally we do not all perceive ourselves as learners when working, or want to be perceived as learning in the workplace, as Boud and Solomon (2003), and so reflection, learning, and experience come to depend on a willingness to engage. Eraut (2000:119) further discusses the problems facing research into non-formal learning, and identifies the difficulties of not only observing learning, but recalling learning, especially if that learning was subtle. Distinguishing between types of learning he highlights that non-formal learning is likely to be considered just part of the work.

Examining notions of learning, and specifically learning at work, places the later discussions within this thesis in context, where experience is examined against a backdrop of professional practice. Understanding how people learn outside of formal education is key to creating potential learning environments, where groups and individuals can experience change (Kasl and Elias 2000).

Illeris (2009b) discusses the extensive and complicated processes of learning

whereby a “comprehensive understanding is not only a matter of the nature of the learning process itself it is also about the conditions that influence and are influenced by this process” (Illeris 2009b:7). His basic model of learning focuses on three points; content, incentive and learning dynamic as they relate to workplace learning, acknowledging that learning takes place at an individual level, as well as a being situated (see figure 8 below).

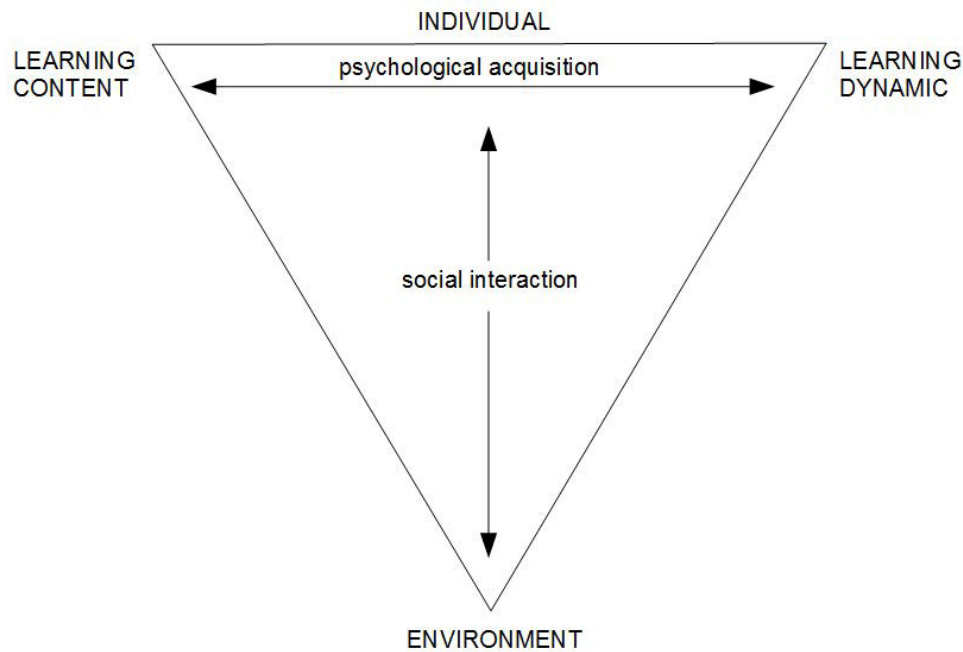


Figure 8. The processes and dimensions of learning (Illeris 2004:436)

Illeris (2011) points us towards the complexity of learning at work, encompassing notions of hierarchy, competency and the conditions under which we work and learn. A more complex model is developed, which builds on the tensions and interconnections between; identity and practice, community and production, content and incentive, individual learning processes and the work itself (see figure 9 below).

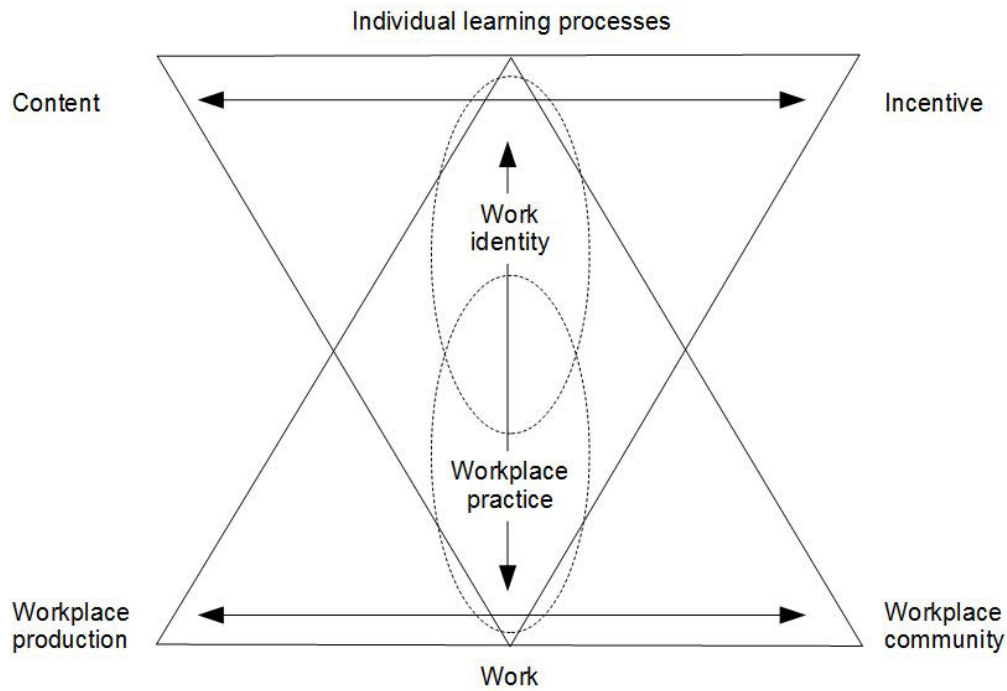


Figure 9. The advanced model of workplace learning (Illeris 2011:43)

Illeris' exploration of workplace learning differs from work based learning (WBL), which provides a more specific approach to learning at work (Eraut 1994). WBL recognises and establishes routes to accredited learning by acknowledging and crediting workplace activities. WBL is delivered in a three way partnership involving the accrediting university, the workplace, and the worker/learner. Formalisation of learning within the workplace presents several challenges for all three parties involved, not least of all how to incorporate it into the structure of the institution, how to ensure quality, how the employer should cost it and how to ensure parity for the learners (Boud and Solomon 2001). Chapman et al. (2013) recognise the non-formal and informal learning within the workplace and posit that the workplace is significant in affording opportunity for experiential learning, particular when it involves pro-environmental behaviours focused on issues of sustainability.

Lifelong learning captures all learning activities; formal, non-formal, and informal, inside and outside of work. Acknowledging the learning that takes place throughout a life, through different methods and at different stages, whether it be self-directed or within a community (Jarvis 2010). This approach to lifelong learning has more

resonance with my research and the learning experiences of the participants as explored through interview transcripts. How learning experiences in lifewide have influenced their professional practice, what Alheit (2009) refers to as biographical learning. This view of learning is from a whole person perspective, learning is not a compartmentalised act within a specific context, or with a specific outcome, aim, or intention. Lifelong learning places an emphasis on the importance of experience, and as Jarvis (2010:38) highlights “it is what we do with our experience” that engenders the learning. Learning in this sense is part of everyday life, a phenomenological consequence that is also situated in community and affected by social structure. Lifewide learning involves experience and reflection, both of which can lead to transformation, but are not uniquely or necessarily transformative.

Reflection on action and reflection in action, is essential in facing new and complex situations in professional practice, as Schön (1991) argued, and can contribute to professional competence. Ward (2013) compares reflection on action to Eraut's (1994) focus on deliberation and metacognition, the supposition being that professionals, when encouraged to engage in critical reflection, become reflective practitioners, and competent professionals, developing knowledge through learning. However as Fenwick (2012) highlights this focus on critical reflection has largely become an orthodoxy for professional education, and in particular continuing professional development.

Reflection is not a linear process, the idealised trajectory of moving forward through time, towards transformational potential would suggest a desire for movement in that direction, or a “directionality towards growth” (Fisher-Yoshida et al. 2009:6). This simplified model, a reduction of Kegan's (2009:47) complex epistemologies outlined in section 1.3.3, does not comment on motivation or any learning that may take place through reflection, and merely acknowledges a relationship exists.

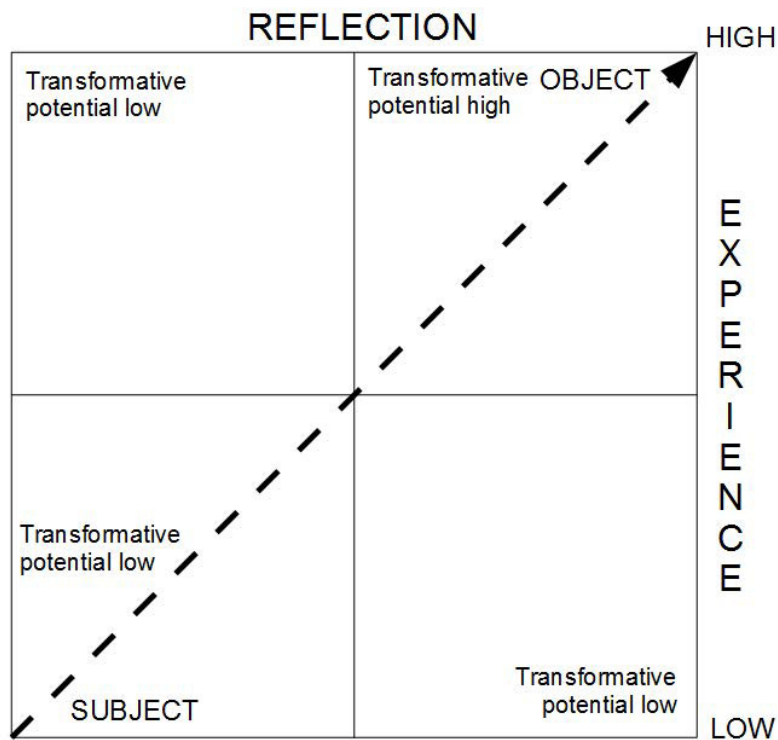


Figure 10. Simplified idealised trajectory to transformation

The relationship of reflective practice to professional practice in this sense is critical, and whilst the example Kegan provides below of course is valuable and humorous, equally we need to ensure that where learning has taken place that reflection is valued to the extent that it can contextualise that learning, and move thinking and practice forward.

Certainly no passenger wants an airline pilot whose professional training was long on collaborative reflective dialogue leading to ever more complex apprehensions of the phenomena of flight but short on the technique of landing a plane in a crosswind (Kegan 2000:49)

Experiential learning and reflective practice can lead to transformation, but are not necessarily transformative. Section 1.3.3 continues to explore the potential of learning as transformation, with specific reference to transformation theory.

1.3.3 Learning as transformation

Transformation as an outcome refers to a deep and lasting change, equivalent to what some people term a developmental shift or a change in worldview [...] the outcomes are considered to be positive and to have a directionality toward growth (Fisher-Yoshida et al. 2009:6).

As discussed in previous sections critical reflection is highly valued within theories of adult learning (Boud et al. 1985; Cranton 2006; Dewey [1938] 1997; Mezirow 2000b). Moon (1999:15) draws on Dewey's detailed analysis of reflection as it rests in the interpretive interests, "making sense of the world" in the process of effective education. The relationship between critical reflection and transformation has been established through research and explored through theory (Cranton 2006; Dirkx et al. 2006; Mezirow 2000b; Moon 1999). Critical reflection and transformation are not interdependent; transformation is dependent on reflection, whereas critical reflection does not necessarily lead to perspective transformation, as Brookfield states:

critical reflection is a necessary but not sufficient condition of transformative learning [...] transformative learning cannot happen without critical reflection, but critical reflection can happen without an accompanying transformation in perspective or habit of mind (Brookfield 2000:125)

Although not adopted wholesale in this research it is worth examining the theoretical framework in which transformation sits, as the theoretical streams within transformation theory provide a framework within which to explore learning further. Fisher-Yoshida et al. (2009:1-7) identify seven key theoretical approaches within transformation theory, which are simplified here with corresponding named key theorists:

- *cognitive rational*: a change in meaning perspective, disorientation, critical reflection, dialogue, past experiences - Mezirow
- *depth psychology*: individuation, a fundamental change in one's personality, connection with the unconscious – Dirkx
- *structural developmental*: whole person learning, a shift to a different stage of development – Kegan
- *social emancipatory approach*: development of critical consciousness, praxis, continuing process of action, critical reflection and dialogue – Freire
- *cultural-spiritual approach*: spirituality and culture, symbolic content, non-rational ways of knowing, narrative in the process of learning – Tisdell

- *race-centric approach*: education for liberation with race and power at the centre – Sheared
- *planetary approach*: individual, spiritual, and social transformation, a call to alter our relationship to the earth as well as to one another – O'Sullivan

Transformative learning, as described by Mezirow (1991), contains ten stages of transformation. Despite being subsequently heavily criticised, particularly for placing too much emphasis on cognitive action and for being overly linear, they provide a useful guide to the development of transformative learning theory. The stages are:

1. a disorienting dilemma
2. self examination with feelings of guilt or shame
3. a critical assessment of epistemic, socio-cultural or psychic assumptions
4. recognition that one's discontent and the process of transformation are shared and that others have negotiated a similar change
5. exploration of options for new roles, relationships, and actions
6. planning of a course of action
7. acquisition of knowledge and skills for implementing one's plans
8. provisional trying of new roles
9. building of competence and self-confidence in new roles and relationships; and
10. a reintegration into one's life on the basis of conditions dictated by one's new perspective (Mezirow 1991:168-169)

The first stage appears to be key in Mezirow's transformation theory, a disorienting dilemma is described by Dirkx as:

dramatic, profound, and deeply moving [...] we are obviously affected by such experiences, thrown off of our normal stride through life. They offer us an opportunity to reflect on and reexamine aspects of our lives that we may not have thought about for many years, if ever. That certain, personally meaningful learning experiences can be disorienting in this way seems clear (Dirkx et al. 2006:132).

Dewan (1993:167, cited in Taylor 2000:291) found that the “transformative process is not necessarily sequential nor was successful completion of one stage contingent upon the previous stages”. Learning does not necessarily contain all ten stages, and the stages do not need to be followed consecutively in order to lead to what Mezirow (1991) terms a perspective transformation, questioning our habits of mind. Not having a trigger in terms of a dilemma does not mean that transformation cannot progress, just as experiencing a dilemma cannot ensure it does. The notion of the dilemma raises many questions in the process of transformation. For

educators, how to create opportunities for transformation without triggering or controlling disorienting dilemmas, raises obvious ethical issues, especially within the classroom (Lange 2000).

Critical reflection, or reflective activity, cannot be viewed as the only route to transformation, even though the relationship is an interconnected one. As Kegan rightly argues informational and transformational learning can be equally expansive and valuable:

[...] one within a preexisting frame of mind [informative] and the other reconstructing the very frame [transformative] (Kegan 2000:49).

Kegan (2009) draws the distinction between information and transformation and begins to describe these difference in his model of complex epistemologies (abridged in figure 11), where the self-authoring mind moves to the self-transforming mind. The model only includes the final three stages that resonate with adult development, as that is what we are examining here. The crucial thing to observe from this diagram is that there are stages and the moving from self-authoring to self-transforming only happens in later life (Kegan 2014), moving from object to subject.

Hostetler talks about the importance of transcendence, but uses this term somewhat interchangeably with transformation, when he talks about the importance of reflection and experience in learning, and the relationship with value creation, suggesting that experience makes transcendence possible allowing the individual to “live a life of philosophical imagination that keeps him or her in touch with and open to the universality of human existence that provides a horizon of value” (Hostetler 2011:200). This relationship with value and transformation (transcendence) for Hostetler is embodied in learning, reinforcing Kegan's model..

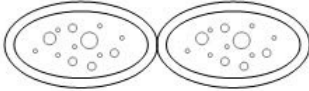
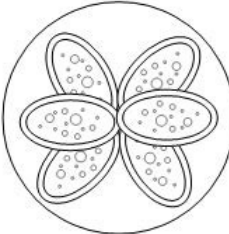
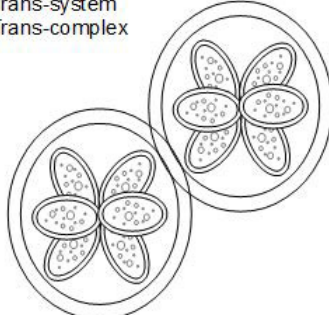
		SUBJECT	OBJECT	UNDERLYING STRUCTURE
The social mind	TRADITIONALISM	ABSTRACTIONS Ideality Inference, generalization Hypothesis, proposition Ideals, values MUTUALITY/INTERPERSONALISM Role consciousness Mutual reciprocity INNER STATES Subjectivity, self-consciousness	Concrete Point of view Enduring dispositions Needs, preferences	Cross-categorical Trans-categorical 
The self-authoring mind	MODERNISM	ABSTRACT SYSTEMS Ideology Formulations, authorization Relations between abstractions INSTITUTION Relationship-regulating forms Multiple-role consciousness SELF-AUTHORSHIP Subjectivity, self-consciousness Identity, autonomy, individuation	Abstractions Mutuality Interpersonalism Inner states Subjectivity Self-consciousness	System/complex-categorical 
The self-transforming mind	POST-MODERNISM	DIALECTICAL Trans-ideological/post-ideological Testing formulation, paradox Contradiction, oppositeness INTER-INSTITUTIONAL Relationship between forms Interpretation of self and other SELF-TRANSFORMATION Interpretation of selves Inter-individuation	Abstraction system ideology Institution Relationship-regulating forms Self-authorship Self-regulation Self formation	Trans-system Trans-complex 
Key: COGNITIVE INTERPERSONAL INTRAPERSONAL				

Figure 11: Increasingly complex epistemologies after Kegan (Kegan 2009:47)

Praxis as described by Freire ([1970] 1996:33) as “reflection and action upon the world in order to transform it”. Freire's work on the criticality of reflection and action and the importance of a dialectic approach, places adult learners clearly in the world, as subject acting on and in the world, creating the world. The importance for Freire is that the participants in the work are 'in' the world, and as they reflect on their actions they realise this and move from object to subject. This formed the basis of a literacy programme where:

We began with the conviction that the role of man was not only to be in the world, but to engage in relations with the world – that through acts of creation and re-creation, man makes cultural reality and thereby adds to the natural world, which he did not make (Freire [1974] 2008:39).

Here the distinction between transformation and transformative learning needs to be drawn, yes there can be a change in practice, a change in approach, but does this necessitate a change in perspective?

This is what Freire meant by praxis-the cycle of reflection, action, and reflection. We reach new insights and understandings-we transform our selves-as we try to transform the world (Schapiro 2009:103).

Murray (2011) has explored transforming environmental world-views by developing a series of workshops drawing on the principles of neuro-linguistic programming (NLP). Where participants encounter sustainability scenarios from various positions. Murray (2013) reports changed participant perspectives following these workshops, and although not directly referencing transformation theory, the accounts of workshop experiences share parallels with Mezirow's theory and in particular the initial point of enacting a disorienting dilemma (Mezirow 1991:168). In Murray's workshops this is a planned dilemma, within a formal learning context, where participants are faced with images of the impacts of climate change, resource use, and water scarcity. These types of reflective encounters have the potential to equally produce a deeper transformation of the soul, which we may not be consciously aware of (Dirkx 2006), or can encourage us to confront wider global and ecological issues beyond human scale (O'Sullivan 1999). Murray is thus creating both physical and psychological space for transformation, considered as critical by Lange (2009:194) who suggests changing our ways of being requires:

new relational experiences with both the social and natural worlds that can prefigure new ways of being, not just thinking; and creating a safe space for committed peer relationships that allows participants to ask deep internal questions and probe broader societal realities (Lange 2009:194)

Herein lies the challenge in the construction industry, where little time is set aside in the site hut or design team meeting for challenging perspectives, and your sense of self.

Underlying personality differences can account for a propensity for reflection and hence transformation as Cranton (1996) comments in her study of transformative learning and the personality traits identified by the psychoanalyst Carl Jungian. Cranton argues that certain personality types may be more prone to transformation, learn more readily or be more open to critical reflection, although these relationships

are dependent on interpretations of critical reflection. Using Jung's personality traits to explore the potential for transformation was inconclusive in Cranton's research, but does draw our attention to the importance of a distinction between sensing and intuition, and mindfulness and discernment, positing that “everyone has the capacity for transformative learning regardless of the route taken to change” (Cranton 1996:132). Daloz (2000) highlights in his research into transformative learning, that there are those who are more prone to altruistic acts. As Jarvis (2009) suggests, learning shapes who we are, and in this sense, learning through professional activity and reflection, influences personality, that process that Jung termed as individuation.

As a result of the work of individuation, each person comes to a deeper understanding, realization, and appreciation of who he or she is [...] Such work may lead to profound shifts in one's awareness or consciousness of being in the world—what we refer to as transformative learning (Dirkx 2006:18/20).

Neuman (1996 cited in Taylor 2000:304) highlighted the interdependent relationship between critical reflection and affective learning, and the importance of recognising feelings and emotions as integral aspects of learning from experience, where an unwillingness to reflect and address emotions or past experience can establish a barrier to transformative learning. King (2005) found, some learners will not want to reflect on their position.

1.4 Summary

The use of finite resources and the relationship between energy consumption, carbon emissions, and climate change, forces the construction industry to address its approach to environmental responsibility. Strategies for implementing change have been much discussed, yet the industry continues to make slow progress towards change, and continues to report a skills and knowledge shortage. Whether change can be achieved through reflecting on experience, learning, and transformation, has been under researched within professional practice and particularly within the built environment professions. The relationship between learning and change has been established in research, but as Brookfield (2000) questions, what type of learning leads to what type of change? Which remains a relevant question within professional practice.

This need not be confined to formal learning environments or higher education; an understanding of the types of learning that take place within professional practice can help to create conditions that foster learning, although as Franz (2010) highlights, in the workplace this presents many challenges not least of all time and trust within a formal learning process.

How environmental responsibility might be achieved has been widely discussed, with some calling for global changes in humanities' approach (Hillman and Fawcett 2004; Marshall 2014; Meadows et al. 2005), whilst others focus on changes within education generally (Hostetler 2011; Huckle and Sterling 2008; Orr 2004), or professional education more specifically (Hartenberger et al. 2012; Murray 2013; Tilbury 2007). From within the construction industry a change is advocated through the questioning of professionalism (Bordass and Leaman 2012; Farrell 2014; Hill et al. 2012). Understanding and promoting transformative learning outside of formal education is under-researched. There is a perceived lack of connection between what is discussed as theory and what is applied in practice (Fisher-Yoshida et al. 2009:1). This qualitative research builds on quantitative studies and contributes to the body of research concerned with developing theories of transformation and social learning (Wals and van der Leij 2007), as well as developing and contributing to the widespread debates centred on ESD within built environment education, and more specifically professional practice within the construction industry (BERR 2008; PP4SD 2000).

External drivers for change are unstable and subject to political and economic forces that are beyond the control of the individual. Taking an approach informed by qualitative research, provides an opportunity to get below the surface and to engage with values, feelings, and experience, something that is less researched in the industry generally. No time is formally spent or accounted for after a project has been completed in exploring the ethical frameworks of those that built it, or how future practice might be influenced or changed by experience on a project. The established strategies to develop environmental responsibility within the industry have been, and remain, the acquiring of skills and knowledge for sustainability, rather than reflection on experiences, values or perspectives. These strategies do not necessarily propagate a change in thinking or a more sustainable approach, as

Wals and van der Leij argue:

After two decades of talk about sustainability and sustainable development, it appears easier to identify what is unsustainable [...] than to identify what it is to be sustainable. What is clear by now is that to break deeply entrenched, unsustainable patterns (assumptions, behaviours and values) requires a new kind of thinking inspired and informed by powerful learning processes (Wals and van der Leij 2007:17)

It is for these reasons that this study does not concern itself with quantifying the outcomes of a particular construction project but asks about the motivations and experiences of individuals involved in getting a building built, focusing on learning and experience, rather than building performance. Where the outcomes of the built projects are examined it is in terms of a potential influence on the people who worked on them, this is discussed in detail in later chapters. Each of the four building projects was chosen for its environmental ambition alone, what it was hoped could be achieved, rather than what was achieved.

It became apparent that an exploration of why some professionals work differently, with a deeper sense of responsibility towards the environment was necessary, rather than further research into why disseminating good practice appears to be difficult, or why developing required skills within the workforce is not happening quickly enough to ensure sustainability targets are reached (Altomonte 2010; HMGovernment 2013a).

One of the constant themes of the environmental movement has been how to get thinking and practical strategies into the 'mainstream'. Research suggests that whilst legislation may require levels of environmental responsiveness, motivation also comes from individual concern driven by values and ethics (Fox 2009b). To that end this research looks beyond the technical fix, the regulatory fix, and the economic fix to explore the potential for change through reflecting on learning and experience. Environmental concerns can be down graded in uncertain economic and political times, placing an even greater emphasis on individual action. This leads us to question how we deal with our built environment in a holistic way, rather than re-compartmentalising problems, as policy and regulation has tended to do. Challenging existing norms, values, tradition and routine within the built environment, through understanding the relationships between the industry,

environmental impacts, and learning, has the potential to unlock a transformation that emanates from the professional outward, as opposed to regulatory change from the top down, or importing skills sideways.

Reflective practice and the role of experience is valued in adult learning but under-acknowledged in professional learning and codes of conduct, particularly in the construction industry. Exploring the relationship between learning and environmental responsibility within a professional context, creates an opportunity to re-emphasise the imperative for built environment professions to respond to the environmental agenda *now* rather than in several years time under a new strategy, policy, or government. Formal learning routes cannot provide the answer alone as architecture students graduating this year may be in influential professional positions in ten years. We need to shape the construction industry so that values can become embedded rather than relying on legislation and regulation to drive actions, which appears to be leading to a skills shortage, rather than addressing a skills shortage. Knowledge is viewed as being acquired rather than allowing change to manifest from values.

By contributing to the ongoing research within related fields, addressing environmental impacts within the construction industry in terms of product use, procurement methods, construction process and equity within the workforce. This research is focused on how environmental practice within the construction industry can influence learning and change through exploring the experiences of practising professionals who have worked on projects with a greater degree of environmental responsibility than that required by building regulation. Regulation alone, whilst contributing to the change in the industry, has been shown to be susceptible to political and fiscal precariousness, hence a caution in over-reliance on top down change in an industry intrinsically linked to environmental impacts. This chapter has explored the defined research realms, however these boundaries remain fuzzy, and whilst there are distinct sections exploring learning, environmental responsibility, and the built environment, these are in no way discreet categories, as learning and values relate to each other so do, values and environmental action, action and ethics and learning and environment action.

Chapter 2: Research methods, processes and techniques

2.0 Introduction

This chapter focuses on how processes and techniques were developed in response to the research aims. The theoretical underpinning of the approach taken is examined as well as the processes used to develop and analyse the knowledge generated through semi-structured interviews. The methods and analysis are informed by qualitative inquiry, examining subjective experiences within the world “as it is encountered in everyday life” (Kvale and Brinkmann 2009:29). These are drawn together with theoretical frameworks informed by learning theory to inform the processes and techniques used to address how environmentally responsible practice influences the construction industry, set against a backdrop of the problematic dominant practices discussed in chapter 1. The research adopts a constructivist paradigm, relativist ontology, subjectivist epistemology and naturalistic methodological procedures (Denzin and Lincoln 2013:27).

Qualitative research consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations [...] qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them (Denzin and Lincoln 2013:6)

The generated knowledge is formed from the experiences of twenty-seven individuals, over the course of twenty-two intensive semi-structured interviews conducted in two phases; phase one in 2010/11 and phase two in 2014. The eighteen phase one interviews were divided into thirteen main project interviews and five scoping interviews. The four phase two interviews were with four people, each person representing a different profession and a different project (see figure 12). A full list of participants can be found in appendix A, with participant information and interview summaries in appendix B.

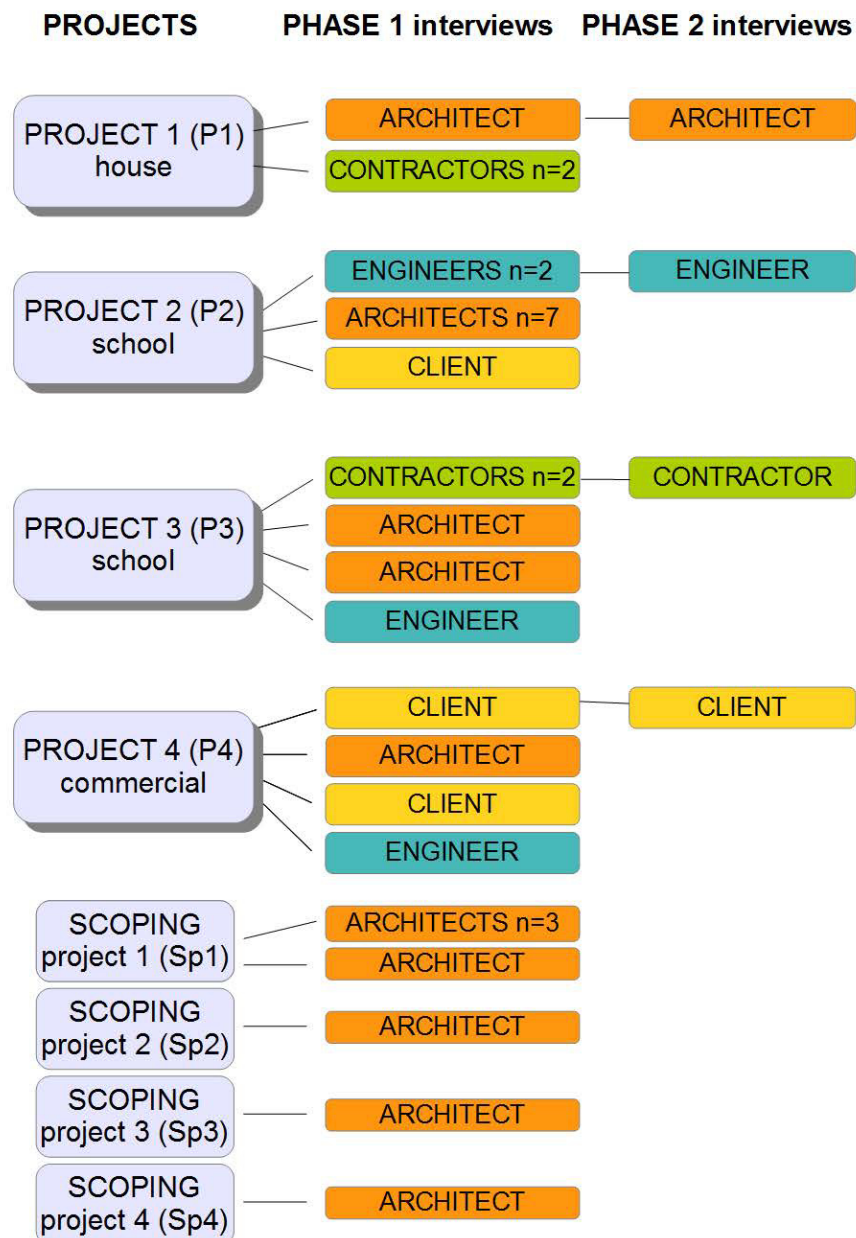


Figure 12. Research interviews - main projects, scoping projects, and professions

An initial study conducted in the early stage of the research process (see figure 13) is discussed in section 2.2. focusing on how the initial workshop influenced the stance taken in within the main study, and the formation of the research questions.

RESEARCH PROCESS AND TECHNIQUES

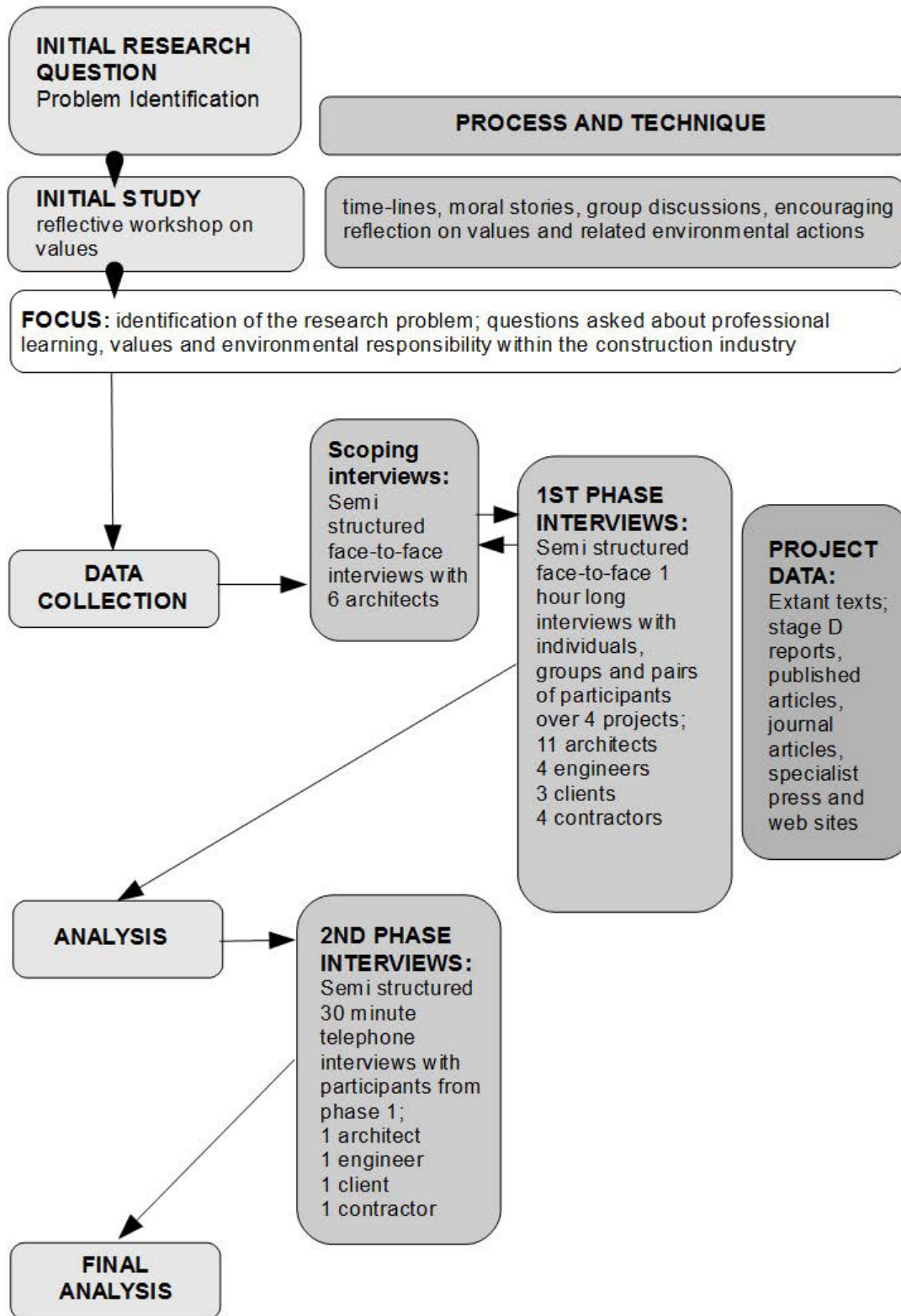


Figure 13. The research process – route taken and participants interviewed

2.1 Conceptualisation

[...] the researcher seeks to be open to the phenomenon and to allow it to show itself in its fullness and complexity *through her own direct involvement and understanding* (Seamon 2000:7).

Identifying who you are is the first step in understanding yourself as a researcher. It is vital to engage in the world to understand it. Being conscious of who we are, how we are thinking and what influences our thinking and perception influences our research, even though we may be reinventing ourselves everyday. Freeman points us to Updike.

Not only are selves conditional but they die. Each day, we wake slightly altered, and the person we were yesterday is dead (Updike 1989 cited in Freeman 1993:69).

A constructivist paradigm has been adopted, borne out of my history, what has influenced my thinking, and what has influenced my approach as a researcher. In phenomenological research some theorists have placed an importance on questioning the researchers presuppositions, recognising that they exist and as some suggest setting them to one side (Hycner 1985). This process of recognising yourself as a researcher within the research is crucial, as Seamon (2000) highlights at the start of this section, researchers have a direct involvement and an understanding of the research, and this forms part of the process. This is critical in qualitative research, particularly where ethnographic methods are adopted (Atkinson and Delamont 2006), and in the qualitative research interview.

in phenomenological research, the question grows out of an intense interest in a particular problem or topic. The researcher's excitement and curiosity inspire the search. Personal history brings the core of the problem into focus. (Moustakas 1994:104)

As Moustakas states above, my research was initiated by an intense interest, regarding environmental motivations and actions within the construction industry. After several years working in the industry and several more teaching, it became apparent that whilst skills and knowledge were addressed, what was less understood were the motivations behind actions, and in particular those motivations relating to environmentally responsible building. Seamon (2000), placing an emphasis on the nature of environmental behaviour and experience, argues that a phenomenological approach is an innovative way for looking at the "person-environment relationship" (Seamon 2000:2-3). He goes on to qualify phenomenological research as "the exploration and description of phenomena,

where phenomena refers to things or experiences as human beings experience them". The body of work that forms this study includes a coalescing of influences from phenomenological research (Moustakas 1994), place attachment (Manzo and Devine-Wright 2014), and environmental behaviours (Light 2010).

The notion of lifeworld is key throughout the interviews, asking people about 'things' that usually just happen in their life, things that have previously not been explored or identified. Certainly, the professionals interviewed in this research would have thought about how to do their work, thought about the process and the project, but not necessarily why they were doing it in a specific way, taking a specific attitude, or how the experience was impacting their future practice. Experiences, as important reflective opportunities or events, tend not to be focused on in the construction industry as "people are immersed in a world that normally unfolds automatically" (Seamon 2000:5). The experience of human beings is a central concept within phenomenology, the notion of the lifeworld; the lived, conceived and perceived experience. Differing perspectives have emerged over the decades, and this research does not intend to unpick those tensions, but rather draw on the influence of phenomenology as it has informed and contributed to our understanding of qualitative research.

Within the last decade, there has been a distinct move in qualitative research towards adopting a mixed method approach. Annells (2006) discusses how grounded theory and phenomenology can be combined to great advantage; with the caution to be careful about making the mistake of aiming for a hybrid product. Eclecticism can be equally appropriate as argued by Teddlie and Tashakkori (2013:136) as a "researcher employing methodological eclecticism is a connoisseur of methods who knowledgeably (and often intuitively) selects the best techniques available to answer research questions that frequently evolve during the course of an investigation". The importance of intuition in creativity is suppressed in brackets in the quote above, however the importance of creativity, in research, is given more emphasis by Coffey and Atkinson (1996:14) when they write "we thus reject what might be called vulgar triangulation while endorsing a sensitive appreciation of complexity and variety". They comment on emphatically rejecting the summing or aggregating of alternative understandings from triangulation when applying varying

research approaches, but rather accept the use of different approaches if the resulting product or products juxtapose understandings that acknowledge the complexity of the phenomena stated. As Coffey and Atkinson (1996) highlight phenomenology looks across the generated knowledge and takes an idiographic approach. They argue that it is important to engage with the knowledge in a creative and intellectual way without assuming that theory can be built by the “aggregation and ordering” of codes or the retrieval of coded segments of text (Coffey and Atkinson 1996:142), an unveiled criticism of grounded theory. This stands in contrast to the bricolage approach discussed by Denzin and Lincoln (2013), although they clearly define the various bricoleur. This eclectic, “quilt-making” approach to qualitative research has equally been criticised (Hammersley and Gomm 2008). For less experienced qualitative researchers it is necessary to pick your way through what at times feels like rather treacherous ground, whilst relying on intuition, as there often is no clear recipe, as Keen highlights:

[...] unlike other methodologies, phenomenology cannot be reduced to a 'cookbook' set of instructions. It is more an approach, an attitude an investigative posture with a certain set of goals (Keen 1975:41 cited in Hycner 1985:279) .

Although this quote specifically refers to phenomenology, the sentiment can equally be applied to qualitative research generally. This contains the essence of the criticism of qualitative research, that it is not replicable (unlike a recipe), implying an unreliability. Although some research methods offer a framework, such as positivist grounded theory, constructivist grounded theory takes a more subjective approach. Both approaches emphasise “systemic inquiry using transparent strategies” (Charmaz 2013:304). This is critical essence of qualitative research, that the methods are transparent, and that they can be followed and understood, rather than adhering to a prescribed or pre-set analytical framework. The benefit of qualitative research is that it allows for an idiographic approach to exploring the world (Denzin and Lincoln 2013), which can then be used to construct theory, inform research and practitioners (Charmaz 2013).

The generated knowledge within this research is unique to this research, as each researcher plays a reflexive role in the interpretation of text; my experience being different to that of others even though there may be common experiences or themes. Whilst it is important to place the processes and techniques of research in

an overall context “methods are not ends in themselves” (Coffey and Atkinson 1996:154). Creswell describes qualitative research as “inductive, emerging and shaped by the researcher’s experience in collecting and analysing data [...] from the ground up, rather than handed down entirely from a theory” (Creswell 2013:61). Qualitative research is not dependent on method or theory alone, an equal importance needs to be placed on the writing, interpretation, and imagination, with an underlying appreciation of the theoretical framework and field; how you talk and write about your research as well as how you conducted it. This research synthesises methods of qualitative inquiry in a broad sense and has adopted and applied appropriate methods that reflect the nature of the research, which is grounded in theory rather constructing theory. Qualitative research, is appropriate as the inquiry is concerned with the everyday lived experiences and situations of real people in real places, including the intuitive and emotional dimensions, an important part of research that is asking questions of values and actions in terms of environmental responsibility (Seamon 2000).

Before moving to discuss the research methods used in the main study (section 2.3), it is worth examining the role the initial study played in developing the research stance and informing research techniques.

2.2 Initial study

Use of a pilot study is a well-documented procedural phase in qualitative research, it can be intrinsic in refining and developing techniques, collecting background information, framing the research question, or adapting research processes (Creswell 2013). A pilot study conducted during the early stages of this research highlighted how transformative experiences can impact on future practice (Pooley 2010). The pilot study highlighted a relationship between transformative learning and a disorienting dilemma related to environmental responsibility which influenced career and study choices.

For the initial study the research aim was focused on formal (university) and non-formal (work) learning environments, and developing an environmental responsibility with future practitioners within the construction industry. This aim was

shaped by my own professional experience of teaching on a post graduate course and working in an architectural practice, and as a response to the ESD and skills shortage agendas in the industry. These combined with the research and debate on values and pro-environmental behaviour, that was emerging within built environment education at the time. The pilot study was developed to explore how built environment professions could meet, what were then framed as, the inevitable demands and expectations of the wider community for sustainable construction, with the broader aim of advancing change within the construction industry through education rather than legislation.

The initial study was conducted in 2007 with eight part-time postgraduate students studying on an environmental master's programme in the UK. They were, or had been, working in various professional capacities related to the construction industry. At this stage the research question was focused on HE, and not aimed at current practitioners and professionals, but future ones. The broadest aim of this initial study was to explore the potential relationships among environmental values, actions, motivations, and decision making. In this initial study I was interested in how students had come to be studying on an environmental course, what decisions had led to that, and more specifically the nature of the relationship between the participants' values and their choice of postgraduate course. One objective was to better understand relationships and motivations by encouraging students to reflect on their values and how those values related to their previous learning, developing techniques to encourage reflection around environmental values and actions.

The student group was self selecting, with students being able to attend or not, although the workshop was scheduled and timetabled as part of the teaching day. The students were studying at the institution where I was teaching, although they were not on my course, and I was not their tutor. The process consisted of a series of three inter-related activities conducted during a two hour workshop. Participation in the workshop was optional for the students and they could withdraw at any time, this was made clear to them at the start of the workshop and at intervals during the two hours. A group discussion, lasting approximately twenty minutes and covering outcomes and techniques was held at the end of the workshop. This enabled students to share their stories and journeys, identifying the significance of their

learning (King 2005; Taylor 2007). An academic colleague was present as observer and note taker throughout the session and the workshop was filmed. All the activities related to the initial study were approved by representatives of the relevant university research ethics committee, release forms signed by participants, and anonymity assured. Three activities were undertaken during the two hour workshop:

Activity one – the moral story

In pairs, students recounted a moral story from their own lives, then discussed the implications of the moral story. Students were guided as to what might consist of a moral story, otherwise interpreted as an ethical dilemma or a noted incident of dissonance (Moon 1999:202). They were not given examples, rather encouraged to think of a time or an incident that made them feel compromised (Marshall and Rossman 2006). This 'ice-breaker' activity; served as a gentle introduction to the concepts behind the other activities and helped participants relax, encouraging them to share stories, and to get to know each other.

Activity two – values

This was informed by the work of Murray (Murray and Murray 2007) and the workshops conducted with construction students. During this activity students wrote down five personally held values, giving consideration to where these values came from, identifying why they were important, and how often they acted in harmony or conflict with them. This individual exercise was used to encourage personal reflection. Participants did not have to share with the group what they had written, although there was an opportunity to discuss this exercise and the outcomes at the end of the workshop.

Activity three – timelines

Timelines, encourage reflection through drawing out a life history and are recognised as an aid to reflection on life history, but are no more stable for being drawn out as Moon (1999:206) suggests:

There are many graphical exercises that are reflective and can generate learning [...] the drawing of a life line as a means of plotting a life history [...] It is interesting to note that the same activity enacted on different days can generate completely different reflections.

This exercise was adapted to encourage students to focus on their life as a learner

and to plot where and when their values had been challenged or changed (King 2009). The aim of this exercise was to encourage a deeper reflection on values and motivations and to place those events in time. The student participants were then encouraged to develop a narrative from the timeline to share with the rest of the group. Drawing the timeline presented more ethical difficulties than the previous two exercises and one person refused to participate as they did not want to share a personal history, although they remained for the discussion. The previous two exercises called for some element of personal engagement, which could easily have been fabricated. A timeline or a personal history, requires reflection and is less easily fabricated.

Outcomes

Using these three different activities was useful in developing research techniques that were not interview based. The first two activities, were deliberately brief and designed to encourage gentle reflection. The third activity was designed to promote critical reflection and led to a rich debate within the group. The outcomes of the initial study were written as a conference paper, which focused on how the reflective activities had assisted students in making sense of their journey as a learner, by encouraging them to reflect on experience (Pooley 2010).

The usefulness of this early research was primarily the uncovering of the relationship between a developed sense of environmental responsibility and wanting to act on it. In the case of the student participants in the workshop this took the form of pursuing environmental education at a higher level. That decision was connected to a single event or issue that transformed their perspective, as evidenced through the analysis of the timelines and the discussions that took place during the workshop. One student was involved in a high profile national disaster, witnessing several deaths, another student attended a lecture, another witnessed a major oil spill on television. These events, varying in magnitude, align with the initial stages in transformation theory: 1) a disorienting dilemma, 2) self examination with feelings of guilt or shame, and 3) a critical assessment of epistemic, socio-cultural or psychic assumptions (Mezirow 1991). In some ways this may be unsurprising as the students were studying on an environmental masters programme, what was surprising was that they had not made a conscious connection between the events

in their life, what Kegan (2009) refers to as prior transformation, and their current situation.

The initial study had multiple outcomes, a significant one being the uncovering of the relationships among reflection, experience, and transformation of perspective, and how this impacted future actions. The outcomes of the study informed the research stance rather than the methods adopted, and following the workshop the research scope was reframed for the main study to address existing professionals working in the industry. The methods of the workshop were not adopted due to the following limitations:

- It would not have been feasible to gather busy professionals together for a two hour workshop; the limitations on their time would have made organising such an event challenging.
- A reflective, values based, workshop might be something you are willing to engage with as a part-time student, it would be harder to engage a construction professional, and this may have adversely influenced the number of willing participants in the main study.
- The timeline is a process requiring time, again creating a demand on availability that was thought to be too intrusive for busy professionals; access to potential participants could be restricted if asking for more time than required by an interview.

2.3 Main study

This section leads on from the initial study in terms of the development of the research project, and provides a commentary on how the participants for the main study were purposefully selected, and how the research interviews were conducted, transcribed and analysed. As discussed above the relationships between reflective practice, transformation, and exposure to an environmental dilemma were explored through the initial study. Whilst this was revealing about those student experiences it was felt that a similar exploration within the profession, leading to an examination of current practice rather than the practice of future professionals would be valuable.

Where professionals within the industry were attempting to address environmental

impacts by reducing energy consumption, green house gas emissions and resource use through their projects, the question remained regarding how that was influencing future practice and the change required in the industry, if indeed it was. An over-reliance on a small number of projects that had attempted to push the agenda in construction, highlighted an obvious need for wider dissemination and adoption of good practice, as well as a greater ethical questioning of our built environment more generally (Fox 2009b). Examining the experiences of those that perhaps have reconciled some of the seemingly irreconcilable issues that Fox raises, within the construction industry; the conflicts of the energy demand, resource use, and ecological impacts discussed in the previous chapter was a way of exploring these issues, arriving at a “topic and question that have both social meaning and personal significance” (Moustakas 1994:104).

To this end the aim of the main study was defined thus: **to examine how practice within the construction industry can influence learning and change by exploring the experiences of professionals who have worked on projects that demonstrate an environmental responsibility.** By focusing attention on current environmental practice within the industry similar relationships to those that had been explored in the initial study, may be revealed and thus inform how practice changes in the industry in relationship to experience. Hence projects were sought where environmental responsibility was demonstrated, in order to learn from those experiences, rather than examining projects that demonstrated a BAU approach to construction. The following section discusses how those projects were selected.

2.3.1 Project sampling

This research occupies territory including environmental behaviours and the built environment, with specific reference to the construction industry professions and the experiences of individuals working within those professions; in particular this research addresses; architects, engineers, contractors, and clients. The four projects sampled represent a range of building types; commercial, residential and educational; all were completed post 2008. The predicted building performance of each building was relevant in the initial selection, as was the overall ambition for the project. The actual performance data for each project is not discussed in this

research as the aim is to penetrate beyond energy performance to examine individual experiences of working on the projects.

With limited resources an approach of “convenience sampling” (Creswell 2013:158) was adopted. Initial approaches were made to architectural practices, known through my professional network, to have a commitment to environmental responsibility, and where a project that demonstrated environmental responsibility had either been recently completed or was in the final stages of completion. Using personal contacts to identify possible participants meant that there was a degree of expedience in establishing those early conversations. These initial conversations led to further interviews. Only six of the eventual twenty-seven participants were known in a professional capacity prior to the research.

Each architectural practice approached had a recent project that fitted my criteria of a building that could demonstrate an environmental responsibility beyond that required by building regulation, a project with a clear environmental agenda and ambition. The intention was to have a mixture of project types, in programme, scale, and budget. By sampling projects of varying size I was able to engage with architectural practices of various sizes, as well as contractors, engineers²¹ and clients with varying degrees of experience. This potentially provided a broader scope to the sample across a range of issues in differing professional contexts.

Having identified eight appropriate projects across seven practices, the project architect(s) for each project were interviewed first. Identified as the primary lead they provided contact information for subsequent interviews with the clients, contractors and engineers; making use of what Creswell (2013) refers to as chain sampling, as each link leads on to the next. Using this method contact was made through each member of the design team progressively via a personal introduction. Other professions were considered, such as quantity surveyors and project managers, but as the process unfolded, it was the clients, contractors and engineers who were most forthcoming and the view was taken to restrict the research interviews to those key professions; the professions with influence on project design, delivery, and completion. Where the initial interview with the project

²¹ Engineers includes services engineers (also referred to as mechanical and electrical engineers) and structural engineers.

architect did not lead on to other interviews, those projects remained within the research as scoping projects (see figure 3 at the start of this chapter and appendix A which contains a list of participants and corresponding consecutive interview number).

Out of the initial eight projects, four were selected as main projects. Scoping interviews did not develop into main projects within the research for the following reasons:

- the environmental measures developed at design stage were omitted in the final construction due to value engineering, meaning that the building project was compliant with building regulations but any further environmental ambition was lost, this was the case with Sp 1 (interview number 3 and 10) .
- the remainder of the team (contractor, engineer, client) was unavailable or proving difficult to contact, this was the case with Sp 1, 2 and 3.
- a late response was received by which time sufficient interviews had been completed with other project teams of similar building type, this was the case with Sp 4 (interview number 12).

This sampling method bears some resemblance to what Charmaz (2006) describes as snowball sampling, in terms of a grounded theory approach. Through my approach to purposeful sampling the total number of participants was increasing but without reaching saturation, as with snowball sampling, as there was a limited number of projects and a limited number of professionals working on each project. The number of interviews could have been developed, and the research pushed out to the wider project team, including sub-contractors. However it was felt necessary to contain the scope of the research, and restrict the number of interviews due to time and economic boundaries. In capturing the experiences of architects, contractors, clients and engineers a range of professions, and the key professions within the design team, were represented, and this reflected the nature of the industry where several professions are involved in critical and key decision making. Although not all members of every design team were available or willing to be interviewed.

The four projects; one house, two school and one commercial project, were in

various UK locations and all demonstrated an approach to environmental responsibility and so were viewed as a representative sample rather than extreme (Creswell 2013). To clarify the distinction between representative sampling and extremes; the two schools selected were representative as they were state funded secondary schools with a restricted budget but with a clear ambition to reduce carbon emissions beyond building regulations. The domestic project selected was a refurbishment, representative of a building type identified by the industry and through the literature as poorly performing in terms of energy conservation. The commercial project was not an extreme example, but again represented an ambition to push the environmental agenda and to test the market in terms of acceptance of explicit environmental strategies. In this way the four projects were not representative of a mainstream approach in construction, but were representative of the phenomenon of a building being constructed with an environmental agenda beyond the requirements of building regulation. The projects additionally demonstrated a stance on ecology, material use, and wider social and community impacts.

A small number of extant texts were used to provide background information on each project. The extant texts consisted of practice profiles, journal articles, trade information, project outlines and websites. Detailed project specific texts were supplied by two of the design teams (P3 and P4), as that information was not publicly available. These extant texts are not directly referenced within the thesis as that would reveal the project details and compromise the anonymity of the participants.

2.3.2 Project outlines

This section contains a brief outline of the four projects used in the main study. These remain as outlines to preserve the anonymity of the projects and the research participants. Hence project details regarding cost, size, and location are withheld.

Project 1 (P1) – House

A challenging and complicated domestic refurbishment of an existing house in an urban location, to very demanding energy conservation standards. A pioneering

project at the time of completion, other single house refurbishment projects have since been completed that demonstrate the significant reduction in energy demands achieve on P1. The architects developed new approaches, as along with reducing energy consumption attention to detail in achieving those savings without compromising the aesthetic, historical or tactile nature of the building was critical.

Project 2 (P2) – Semi-rural school

A secondary school for a central England local authority, designed to BREEAM very good standards and run as a design and build contract with the architects on a framework agreement²² with the contractor. The ambition for the school went beyond the BREEAM assessment criteria to include assessment by the architects in terms of sustainable construction and overall carbon emissions, as well as additional pro-environmental actions. Detailed carbon foot-printing information was disseminated to the building users and wider community as the school was constructed, this was a key aspect of the project.

Project 3 (P3) – Urban school

A secondary school for a local authority in the south west of England, designed to a BREEAM very good standard. This project benefited from additional funding from a government initiative. This school, one and a half times larger than P2 in terms of student numbers, also included community facilities. Carbon emission reductions, renewable technology and material use were important aspects of this project, which was on a very restricted urban site with challenging limitations.

Project 4 (P4) - Commercial

A speculative developer led project run on a design and build contract. With several innovative material and engineering aspects this building represented a step change in commercial design at the time of construction and completion.

Scoping projects:

The scoping projects varied in building type;

- scoping project 1 (Sp1) - a medium sized urban social housing development

²² A framework is an agreement with suppliers to establish terms governing contracts that may be awarded during the life of the agreement *Constructing excellence: what is a framework?* 2015. [online]. Available at: <http://constructingexcellence.org.uk/tools/frameworkingtoolkit/what-is-a-framework/> [Accessed: 6th June 2015]

- scoping project 2 (Sp2) - social housing in a semi-rural location
- scoping project 3 (Sp3) - an inner city sports centre
- scoping project 4 (Sp4) - a rural primary school

Each project had an environmental agenda that conformed with the sampling criteria. It is worth noting that the scoping project interviews were conducted with architects only as discussed in the previous section. The scoping interviews were transcribed and analysed, in this way they make a contribution to the research by informing process and provide additional context in chapter 4, and support the emergent themes discussed in chapter 6.

2.3.3 Research interviews

Interviews were used specifically to enable exploration of the multiple realities and experiences of the participants. Interviews are professional conversations, as Kvale and Brinkmann (2009) discuss, and act as an *inter view*; a way of attempting to understand the point of view of the participant, or the meaning of their experiences, through “an inter-change of views between two persons conversing about a theme of mutual interest” (Kvale and Brinkmann 2009:2). The reflective nature of inquiry is key within this research and therefore crucial within the interviews. Although interviews are only one way of conducting qualitative research, they were felt to be the most appropriate way of holding those important conversations to explore what is often referred to as the “taken for granted knowledge” (Clegg 2013) or our taken for granted frames of reference (Mezirow 2000b). Marshall and Rossman claim that:

the primary advantage of phenomenological interviewing is that it permits an explicit focus on the researcher's personal experience combined with those of the interviewees. It focuses on the deep, lived meanings that events have for individuals, assuming that these meanings guide actions and iterations. It is, however, quite labor-intensive and required a reflective run of mind on the part of the researcher (Marshall and Rossman 2006:105)

As Denzin (1997) comments, researchers sometimes mistakenly use research interviews as a way of reproducing realities, whereas they can only give an insight into participants' recollections and perceptions of experiences and understanding. The researcher cannot presume there is a world “out there (the real) that can be captured by a “knowing” author through the careful transcription (and analysis) of

field materials (interviews, notes, etc.)” (Denzin 1997:4). Interview knowledge is conversational and contextual; as human life and understanding are “both in the here and now and in a temporal dimension” (Kvale and Brinkmann 2009:54). Interviews are situated in time and place; reflected in what is said, who says it and to whom they are saying it. There has to also be an acknowledgement of the conversation, of the human interaction that takes place during the interview, recognising this is a crucial part of the interview itself (Moustakas 1994). The situated nature of interviews resonates with notions of temporality, which have been variously explored through phenomenological theory, and in particular Merleau-Ponty:

A past and future spring forth when I reach out towards them. I am not, for myself, at this very moment, I am also at this morning or at the night which will soon be here, and though my present is, if we wish so to consider it, this instant, it is equally this day, this year or my whole life (Merleau-Ponty [1945] 1962:421).

We cannot know what would have been said or what conversations would have taken place with the same participants on another day. The participants will have a different story, reflect on their experiences in a different way dependent on the day, as Moon (1999:206) suggests “the nature of 'today' determines what is 'picked up' in reflection on the past”. These arguments relate to the epistemological issues regarding interviews and the generation of knowledge, the contextual aspect is particularly critical as the knowledge produced within an interview moves from the interview into research and then the public domain. Whilst acknowledging the restricted nature of recollection and perception, the focus of the research was on recalled experiences, this coupled with holding a professional conversation with professional actors, it was felt that the use of interviews was authentic as they suited the research's scope, aim, and resources.

One aspect of transformation theory is the relationship between reflection and changes in perspective. Hammersley and Gomm (2008) highlight the issue of using interviews to understand people's perspectives, and remind us that during an interview participants may say what they think wants to be heard. At the very least participants are responding to the questions they are being asked. Introducing reflective questions and personal values was sometimes hard to achieve, and more successful in some interviews than in others. Confidentiality within the interviews,

therefore, was crucial in discussing the experiences of the participants, their thoughts, and feelings. The participants had full knowledge that I was conducting research into environmental actions and responsibilities, which may have led them to discuss their thoughts about environmental behaviours, as well as their level of concern over future impacts of the industry and human activity more freely. Their agreement to be interviewed implied a willingness to discuss these issues openly. Hammersley and Gomm (2008) recommend interviewing a second or third time to ensure perspectives are consistent, or checking against other data. This becomes relevant within this research as there is much focus on perspective, and identifying changes in perspective. This has been done through the interviews, rather than attempting to establish the perspective of a participant through analysis of other material or texts. In this respect where changes in perspective have been identified it is through those interviewed.

Eraut (2000) additionally cautions researchers in their attempts to capture learning through recalled experience. As Atkinson and Delamont warn:

When it comes to personal narratives, spoken performances, oral testimony and autoethnographies, we should not simply collect them as if they were untrammelled, unmediated representations of social realities. While the development and spread of qualitative social science are to be welcomed, too many of its manifestations result in slack social science, born of an adherence to the evocation of 'experience', as opposed to the systematic analysis of social action and cultural forms (Atkinson and Delamont 2006:170).

Although Atkinson and Delamont are more specifically referring to narratives the warning regarding understanding experience through accounts is relevant. This brings us back to the importance of the professional conversation, and places an emphasis on the analysis as well as the interview process itself, and where my previous experience interviewing industry professionals, and those in higher education, as part of evaluative research work for the higher education academy was invaluable.

In total twenty-two intensive semi-structured interviews were conducted with twenty-seven individuals over the course of four years, and in two phases; phase one in 2010/11 and phase two in 2014. The eighteen phase one interviews were divided into thirteen main project interviews and five scoping interviews. The four phase two interviews were with four people, each person representing a different profession

and a different project (see figure 3 and appendix A). A brief summary of the interviews is provided below:

Phase one (2010/11) thirteen main project interviews with twenty-two people:

- five interviews with architects – a total of eleven people
- three interviews with engineers – a total of four people
- two interviews with contractors – a total of four people
- three interviews with clients – a total of three people

The interviews were structured as:

- three interviews in pairs (all face-to-face)
- one group interview (a group of seven face-to-face)
- nine individual interviews (eight face-to-face and one telephone)

Phase one (2010/11) five scoping interviews with five people (all scoping interviews were with architects and face-to-face):

- one group of three – Sp1
- four individual interviews – Sp1, 2, 3, 4

Phase two (2014) consisted of four semi-structured interviews with four people, one from each project:

- one architect – P1
- one engineer – P2
- one contractor – P3
- one client – P4

The anonymity of individuals and projects was guaranteed to enable interviewees to be candid about their feelings and experiences. Each participant signed a release form and was made aware of the research ethics and the obligations towards them as research participants. The interviews were transcribed from sound recordings, neither transcripts nor a synthesis of the interviews were reissued to participants. It remained my responsibility as researcher to report accurately what was said as part of an ethical obligation in the research. All participants' names have been removed

and projects are referred to by number; all participants, projects and locations remain anonymous throughout.

As Gillham (2005) suggests a time limit was set prior to all the interviews, the average length of the face-to-face interviews was approximately an hour, telephone interviews being slightly shorter. All interviews commenced with general questions about role and responsibilities on the project, these served as warm-up questions, were straightforward to answer and initiated the recording of relevant details (Denzin and Lincoln 2013; Gillham 2005). The conversation would then move on to the experience of working on the project, which included conversations around the profession and industry more generally, and led to reflection on university, college and early adult life. The interviews were a professional conversation, touching on personal values and motivations and to this extent the participants were acting as expert witness, in a position to comment on the industry as a whole as well as their own experiences within it (Gillham 2005). The openness of the semi-structured interview suited the reflective nature of the research as a whole and allowed for a free flowing conversational feel. Charmaz (2006:19) discusses the importance of rapport building, and this was vital not only for maintaining the conversation during the interviews, but allowed for the follow up interviews to take place, several years later, as part of phase two.

Over three years elapsed between the phase one interviews, in 2010/11 and the phase two interviews in 2014. The landscape had changed politically, economically, and legislatively, during that time. I felt it would be useful to revisit a small number of the original interviewees to reflect on the projects again given the time that had elapsed and their subsequent experiences within the industry. In phase two the conversations revolved around asking what do you know now that you didn't know then? What changes have you experienced in the industry? How have they impacted on you, your profession, and your practice? The phase two interviews provided greater context, updated the original knowledge, and enabled continuity within the research that would otherwise have been absent.

Three years may seem like a long time between the first and second phase interviews, but in the construction industry it is a relatively short period - typically the

length of time required to develop a project. It was a useful length of time, as the building projects were complete, occupied, and had been for over a year. The participants had moved onto other projects, and so were able to reflect on the influence the original project had on their work, on legislative changes in the industry, and on societal changes more generally. Detailed outcomes of phase two interviews are explored in chapter 3, where the experiences of the four participants are examined in depth. Having discussed the interview process generally, it is worth discussing the different types of interview conducted, as there is a hierarchy within any interview and the dynamic of a group situation differs from that of an individual interview (Kvale and Brinkmann 2009).

Individual interviews

There is a strong argument within social sciences literature for the use of interviews in qualitative research (Charmaz 2006; Coffey and Atkinson 1996; Gillham 2005). During an interview there is direct involvement and understanding, focusing on the lifeworld of the participant the knowledge is obtained through an “interpersonal interaction” (Kvale and Brinkmann 2009:28). This interaction can be more meaningful and more personal in a face-to-face interview where only the subject and the researcher are present. However, there exists a power asymmetry in the relationship between interviewee and interviewer (Creswell 2013:173), as in most conversations, even though in this case there was no intentional exertion of power in the interviews, it is necessary to be cautious of contextual nature of the interview. The key is for the interviewer to reflect on the role of power in the production of knowledge (Kvale and Brinkmann 2009:34). The power dynamics shifted during each interview, and differed among the interviews. Location influenced the dynamic; interviewing someone in their own prestigious office can shift the power to the them. Interviewing in neutral space lessens the affect of the asymmetry. Neutral spaces were therefore chosen where possible to conduct the interviews, the recording device was very discreet, and I did not sit with a list of interview questions in front of me. No note taking was done during the interview in order to maintain eye contact, a conversational feel, and to also not alert the participant to issues they may be raising as more important than others. Note taking is distracting during an interview and can adjust the hierarchy, and make the participant feel some of what they are saying has more value than others, and hence adjust their responses accordingly (Gillham 2000). Listening and engaging the interview is more important than taking

notes, if it is being recorded. Notes on the interviews were made immediately after the interview had ended (see appendix B).

Group interviews

Two group interviews were conducted during this research, one in P2 with a group of seven, and one in Sp1 with a group of three. These two group interviews were at the suggestion of the architects at each practice, providing me with access to several staff in one interview, and providing the practice with an opportunity to reflect as a group. The practices took on the responsibility of putting the groups together, having discussed my research and the focus of the interview. One practice being larger than the other, accounted for the differing numbers of participants. Both practices having a strong sense of community; consultation and group activities were part of the office culture. For the participants gathering with colleagues was not an unusual occurrence and during both group interviews comments were made about the value of reflecting on a project as a group and an opportunity they would like to have more often. In this respect the group interviews were serving the agenda of the practice as well as the research, as the practices found the group interviews useful. For my research group interviews did afford access to more people, but they also presented additional difficulties during transcription and analysis. The group discussions proved to be very insightful, although less personally reflective than the individual interviews. Research suggests group interviews, or what are more commonly referred to as 'focus groups' in market research, can help create broader discussion around a subject, as group interaction has the possibility to lead to discussion of wider or more diverse issues. As Kvale and Brinkmann (2009:150) found:

Focus group interviews are well suited for exploratory studies in a new domain, since the lively collective interaction may bring forth more spontaneous expressive and emotional views than in individual, often more cognitive, interviews.

The large group interview, of seven, was filmed to help with transcription and analysis. Filming a group, especially a larger group, enables the non-verbal communication between participants to be viewed as well as identifying the individual contribution of each participant. Filming and sound recording can affect how people feel and behave during an interview, the impact of filming or recording

on an interview lessens as the interview progresses, as experienced during the initial study with students. The difficulty in establishing how the discussion may be influenced by the presence of a camera or recording device has been well documented (Gillham 2005:90). A small discrete video camera was used to film the larger group on P2, this was the only group filmed as it was the only one that contained multiple voices and hence potentially more chaotic to transcribe. The difficulty of transcription being more problematic with a group interview due to the multiple voices.

There was a tendency in the group interviews to focus on the professional context of environmental behaviour, responsibility, and action, the participants appearing to be more comfortable discussing professional issues than personal aspects of environmental responsibility or values. Less willingness to discuss personal aspects of professional experience could suggest the existence of a power asymmetry within the group, not wanting to divulge more personal experiences to colleagues. A power asymmetry can be amplified in a group interview where a professional or organisational hierarchy already exists, a dynamic that is not immediately evident to the interviewer (Creswell 2013). The dynamic unfolds among interviewees in the group through the transcripts, this too can be observed in the filming of the larger group, and it is important to be aware of this when transcribing and analysing the text, it was the experiences that were being examined, and as the interview progressed, particularly with the larger group there was evidence of a relaxing. Within some research paying attention to the paralinguistic in analysis is as important as the linguistic (Hycner 1985), however, the non-verbal communication within the group was not analysed within this research,

In addition to the two group interviews, three interviews were conducted in pairs. Even though the number of participants was only one less than the group of three, the dynamic was more intimate. The paired interviews - with the contractors on P1 and P3, and the engineers on P2 - were again arranged for the convenience of the participants, time being a key issue. Gillham (2005:65) suggests a good number for a group is somewhere between six and ten, anything less than six may not be “sparky” enough, although this was not the experience with the paired interviews, as they were lively conversations without presenting the complexity of a larger group

interview. An interesting aspect of the paired interviews was that each pair of participants already had a very close working relationship. In one pair this association extended beyond their professional working life into personal and familial relationships. That closeness was tangible, and the interview very relaxed as a result, with the participants able to 'play-off' each other, my contribution to the conversation increasingly becoming more observer than interviewer. The three paired interviews were longer than the individual interviews but approximately half an hour.

Telephone interviews

All four of the phase two interviews and one phase one interview were conducted via telephone due to location and time constraints. There are well-documented advantages and disadvantages of telephone interviewing (Creswell 2013; Kvale and Brinkmann 2009). Within this research the advantages were; expedient use of time, easy and fast access to participants, and not overly imposing on participants' busy working schedule. The obvious disadvantage of telephone interviews is the lack of physical interaction and face-to-face contact, that is valued as part of the interview process. Despite this the conversation can be maintained in a telephone interview, even though all the non-linguistic communication and interaction that occurs in conversation and interviews is lost. This was not a concern, potentially in the phase two interviews, as a rapport was already established through the first phase interviews.

Telephone interviews, by their nature, tend to be more structured, less conversational and usually shorter. In this case the phase two interviews lasted approximately half an hour, the questions being based on a re-reading of the transcript and re-listening of the recording from phase one, thus taking issues raised in the first interview forward. The telephone interviews offered the opportunity for further reflection on the project over a prolonged period of time, whilst expanding on experience, both past and current. Marshall and Rossman (2006:104) draw on Seidman (1998) to illustrate an approach to phenomenological interviewing that involves three interviews; firstly focusing on past experience, secondly on present experience, with the final interview joining the two narratives. Within this research the narratives are joined through phase one and phase two interviews examined in detail in chapter 3.

2.3.4 Transcribing

Language and speech do not mirror experience: they create experience and in the process of creation constantly transform and defer that which is being described. The meaning of the subjects statements are, therefore, always in motion (Denzin 1997:5)

The process of transcribing interviews is both time consuming and enthralling. Whilst it is feasible to send sound recordings to be professionally transcribed, as there is a time advantage in outsourcing transcription, I wanted to retain a closeness to the text and a consistency in transcription, so completed the transcriptions myself. The enthralling part is that transcriptions are more detailed, explicit and multi-layered than could be captured by jotting down key points after an interview, as Denzin (1997) highlights, language and speech are fluid, and create experience through description.

As Kvale and Brinkmann (2009:129) highlight, it is not unusual for interesting or relevant topics to be discussed after the recording device has been turned off. This happened in some of the interviews, and where that is the case, those topics were noted down as soon as possible after the interview; so do not appear on transcripts. Although they remain within the research these topics were brought up after the sound recording device was turned off, and the interviewee may have felt their contribution to the research ended when the recording ended, this has been respected within the analysis, and issues have been referred to more generally.

The transcriptions²³ are verbatim, where there are missing words convention was used to indicate this [...], as can be seen in later chapters where extracts from interviews are used. Pauses are indicated, and where there were significant non-verbal communication this is also indicated. These non-verbal exchanges were retained as they add a sense of the context of the interview. Despite several re-listenings there remain some points in a small number of interviews where the conversation is indecipherable, this is mostly due to unexpected and uncontrollable background noise.

Once the initial transcripts were complete, they were revisited whilst re-listening to

²³ Transcripts have not been included but are available upon request. Extracts from the transcripts are included throughout, and in particular in chapters 3, 4, 5 and 6

the interview. In this way discrepancies were picked up and corrected; listening back repeatedly for the actual words spoken and taking time to clarify what was being said. It was necessary to listen to the recordings several times, once or twice to discover discrepancies, and then listening again to elicit meaning. Although the process of listening for accuracy should not be confused with listening for a sense of the whole in the analysis process, these are inter-related and inseparable events. Re-listening for accuracy brings you closer to and more familiar with the material, and is a valuable and crucial process in the analysis, discussed further in the following section.

2.3.5 Analysis

This section examines the analysis of the interview transcripts, a process informed by an interpretive framework. Using interviews as a research method, you are witness to what participants have chosen to discuss, rather than establishing fact. Analysis of interview transcripts allows meaning to emerge through the experiences the participants have discussed, their interpretation of events and, in turn, through the researcher's interpretation of the generated knowledge (Hycner 1985). This reference to *generated knowledge* is used throughout the research, the knowledge being generated through the interviews, transcription, and analysis.

Qualitative data analysis requires methodological knowledge and intellectual competence. Analysis is not about adhering to any one correct approach or set of techniques; it is imaginative, artful, flexible, and reflexive (Coffey and Atkinson 1996:10).

The analysis of the transcripts, is explored from three different perspectives and is conceptualised here in terms of a prism with three different lenses; the building project, the construction industry professions, and the individual participants (see figure 14).

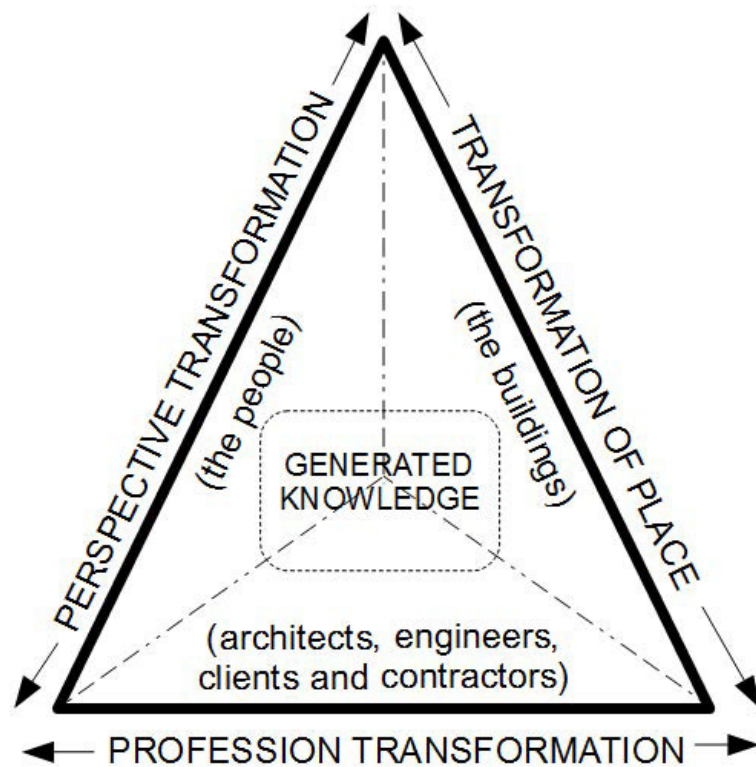


Figure 14. The three lenses of analysis

This diagram emerged from the drawing out of the research boundary, and it was developed as a way of visualising the limina of the research. The generated knowledge bound by, but also viewed through, this prism or three lenses. It has been used as a means of exploring possible meanings and divergent perspectives (Creswell 2013), engaging in what Coffey and Atkinson (1996:10) describe as imaginative, artful, flexible, and reflexive analysis. Each reading and rereading of a transcript was undertaken by looking through one of three lenses, as described in figure 14; the building projects (the buildings), the construction industry professions (the professions), and the individual participants (the people). After listening for the meaning of the whole, the focus of each rereading of a transcript or each re-listening of an interview was through a different lens to gain an understanding of the experiences from each perspective, using each lens as an interpretive tool. Reflecting what Annells (2006) suggests by the turning of a prism, when she recommends adopting three theoretical approaches as a way of redefining the tension that can exist between the role of the researcher and the generation of text. Annells' approach has been reinterpreted here as an exploration of the complexity of the experiences explored within the interviews. In this sense there is a three-way

approach to analysis and also to the reading and interpretation of the generated knowledge.

The relationship between an interpretation of experience by the participant, and by the researcher is explored within phenomenological research as the concept of bracketing or the phenomenological reduction (Creswell 2013; Denzin and Lincoln 2013). Hycner (1985) suggests writing all presuppositions down as the analysis progresses; the compiled list enabling the researcher to become conscious of their presuppositions and setting them aside. My previous experience, teaching and working in the industry, exert an influence on my interpretation of the research and manifest in presuppositions borne out of experience and opinion. However, as researchers we are part of the world and our consciousness of our presuppositions may be allusive. Therefore the counter argument is that we accept our part within our research, we accept our part in the world, with an attempt at consciously setting aside those presuppositions we are aware of (Seamon 2000). This captures a long standing discord in phenomenology, which questions our ability to bracket our thinking and our understanding.

The critical issue is that the approach to analysis needs to be relevant to the research aim, but there is no one clear way, method or system. Hycner (1985:280) reiterates Keen's sentiment that there is no recipe or procedure, and that no method can be arbitrarily imposed as "it is more an approach, an attitude an investigative posture with a certain set of goals" (Keen 1975:41 cited in Hycner 1985:279). Spiegelberg (1982 cited in Seamon 2000:8) also argues that there is little direction or precise instruction that can be given when adopting or adapting a phenomenological approach. This lack of recipe or instruction allows one to stay open and ask what is being said about the experience and how it is being described, with an intention to uncover a unique way of seeing the world. In many respects, a lack of recipe can be confusing, as Seamon (2000:9) states "the phenomenologist does not know what she doesn't know". Therefore it is vital that the main aim of the study is retained and the broader principles of qualitative research are embraced. An interpretive approach to analysis is pliable and flexible, Moustakas (1994) argues that the key element that binds all approaches is the

retention of the aim of the inquiry, and that the analysis is conducted in accordance with that aim.

Within the analysis method adopted here, meaning emerges through the reading and re-reading of the transcripts, and a listening and re-listening to the interviews. This interpretive analysis process was undertaken simultaneously whilst further research interviews were being conducted. This bears similarity with grounded theory where coding and data collection are simultaneous actions, but my analysis diverges from grounded theory, where eventually saturation is reached (Charmaz 2008), as saturation is not reached in my research. Hycner (1985) outlines fifteen stages of analysis, placing an emphasis on the first five stages; 1) transcribing, 2) bracketing, 3) delineating units of general meaning, 4) listening for a sense of the whole, and from that 5) delineating units of relevant meaning which are then clustered into themes. Emphasis is placed on the emergent themes, which are formed from significant meaning (Moustakas 1994). These first five stages compare similarly with Creswell's (2013:207) more reduced approach: 1) bracketing, 2) significant statements, 3) meaning units, 4) textural description, and 5) structural description. My approach delineates meaning through each lens through the process of listening for the sense of the whole. The interpretive process used here requires the examining of individual experiences, and a bringing together of those experiences to describe common meanings or themes, the terminology is adapted from Giorgi (1992). The first bringing together is described within this research as the *units of general meaning*, which are only uncovered via several passes over the knowledge, these then form *clusters of relevant meaning* (Creswell 2013:76; Smith 2010). This process, what Seamon (2000:7) describes as intuiting "requires discipline, patience, effort and care [...] students can find their way to intuiting only by themselves, often in hit-and-miss fashion". Perhaps Seamon's terminology is overly colloquial, but the sentiment, of finding a way through analysis and interpretation towards meaning as a process, echoes issues raised earlier.

The first stage of analysis was identifying units of general meaning from the transcripts, similar to a line-by-line coding process. This was initially done by hand directly onto the transcript, and then transferred to a table. An example of this approach is taken from interview number one, with the architect on P1 (see figure

15 below).

we sort of progressed and kept returning to the client saying, well if you have this much insulation, we've done some calculations you'd be saving this much energy, but if you have a bit more here and a bit more there you're actually getting down to really low energy levels and the client, because one half of the client at least that's what they do they are an energy consultant they were tempted down that path and that led us on to learning to do energy modelling properly using SAP to then getting into the broader passivhaus planning stuff.

3:19 So in terms of our learning there was that, then in terms of having got to a stage where we were reasonably confident we'd made an energy tight building on paper then there was the translation of that and working with [redacted] and [redacted] and resolving the engineering issues in terms of holding the building together without introducing lots of cold bridges and air leaks and that sort of thing, which was quite difficult because engineers are usually very unfamiliar with those sorts of concepts they'll just put in things to hold things together where it's most effective but often those don't coincide with a low energy strategy so there was quite a lot of push and pull on that front and I think [redacted] as a builder is actually sort of quite sceptical of things which on the whole I think scepticism is very good but that means we have to re-justify everything we do to him and to some extent to explain why we were doing those things, to explain what a cold bridge was which he's an intelligent guy and is perfectly capable of

Handwritten notes:

- pushed the client further
- the client's influence
- was a learning opportunity
- new skills & knowledge
- confidence
- moving from theory to practice
- collaboration - working with contractor & engineer
- new for engineers
- push & pull - engineers
- introduce "things"
- justify decisions to sceptical contractor
- have to explain concepts - learning then teaching

Figure 15. Sample coding by hand - interview number 1

Here units of general meaning are identified, what can also be seen is the colour coding for each profession. The colour coding remained constant throughout the analysis of all interviews; green = contractor, yellow = client, blue = engineer, pink = architect. Further colour coding was used when looking through the project and the person lens (orange = project, grey = person). A further example can in be seen in figure 16, taken from interview number two, with the contractors on P1. This shows where issues overlap, as some comments have relevance to more than one profession. The process of completing the analysis by hand was time consuming but more immediate than the initial attempts at coding using NVivo. The process of using software for analysis was overly cumbersome for such a limited number of interviews, and all being analysed by one person. An example of the resulting nodes from the initial NVivo coding can be found in appendix F.

12:59 the brick work stays the same, [redacted] road ended up zero rated for VAT because demolition is zero rated and new build is zero rated whereas this one is	<ul style="list-style-type: none"> • zero rated, so much demolition
13:09 the back walls stayed up, it's a terrace the back walls stayed up, the roof stayed up, erm it's going to be different because there's loads of stuff we learnt from [redacted] Road that we've and even on the stuff that we're doing now we're doing stuff we'll go oh, we can do this we can change this, we can do this you know we're still thinking of different ways, so if we do another one we'll probably be quicker again	<ul style="list-style-type: none"> • learnt from [the project] • learnt a lot on project • confident in knowledge • thinking of new solutions • confidence in change-acceleration in learning and working
13:34 the trouble is you'll never get another one the same ever er my big argument on this is the amount of money that gets spent you know we're going for the double gold star award you know, to get that extra gold star the laws of diminishing returns are that, you're just getting nowhere, I really think that you know if you spent £100k on a house to get the gold star, actually you'd be far better off spending £50k on two houses for the amount of carbon you're going to save, but nobody is ever going to look at it that way because anybody who designs these things does it wants to win the bloody competition not the war, yeah	<ul style="list-style-type: none"> • cost of this way of working • too much for one property • thinking of solutions • designers/architects by implication are short sighted, not looking at long term goal or bigger picture
14:40 well I suppose it's like spending a lot of money on wind-turbines or you see quite a lot of those now don't you, the vertical axis wind-turbines on buildings where if you had that	

Figure 16. Sample coding by hand - interview number 2 – showing multiple issues

Following coding by hand the units of general meaning were then formed into clusters of relevant meaning, a distilling process, that Kvale and Brinkmann (2009:206) refer to as meaning condensation, this is illustrated in figure 17 below:

INTERVIEW NUMBER: 1 PROJECT NUMBER: 1 PROFESSION: Architect		
verbatim text from interview:	units of general meaning:	clusters of relevant meaning:
3:19 So in terms of our learning there was that, then in terms of having got to a stage where we were reasonably confident we'd made an energy tight building on paper then there was the translation of that and working with [contractor] and [engineer] and resolving the engineering issues in terms of holding the building together without introducing lots of cold bridges and air leaks and that sort of thing, which was quite difficult because engineers are	<ul style="list-style-type: none"> • in terms of our learning there was that • we were reasonably confident we'd made an energy tight building • we'd made an energy tight building on paper • working with [contractor] and [engineer] and resolving the engineering issues 	<ul style="list-style-type: none"> • new knowledge • confidence • moving from theory to practice • collaboration with others

usually very unfamiliar with those sorts of concepts they'll just put in things to hold things together where it's most effective but often those don't coincide with a low energy strategy so there was quite a lot of push and pull on that front and I think [the contractor] as a builder is actually sort of quite sceptical of things which on the whole I think scepticism is very good but that means we have to re-justify everything we do to him and to some extent to explain why we were doing those things, to explain what a cold bridge was which he's an intelligent guy and is perfectly capable of grasping those issues, they were things which most, 99% of UK builders just aren't, have never come across	<ul style="list-style-type: none"> • engineers are usually very unfamiliar with those sorts of concepts • put in things to hold things together • don't coincide with a low energy strategy • quite a lot of push and pull • builder is actually sort of quite sceptical of things • we have to re-justify everything we do to him • extent to explain why we were doing those things • he's an intelligent guy and is perfectly capable of grasping 	<ul style="list-style-type: none"> • learning for engineers • effective working • push and pull • justifying decisions • explaining concepts • learning then teaching
--	--	---

Figure 17. General meaning and relevant meaning

Reading the transcripts with the research question in mind allows the units of general meaning to emerge. In this analysis the clusters of relevant meaning, developed from the units of general meaning, capture the participants experiences as they relate to both the physical project and the process of working on the project. How participants choose to talk about that experience is an account of the experience expressed through memory. It is possible to express this as a tension between the world as it appears and the participants' experience of it, what is explored here is the world as it is experienced by the individual.

The aim is to determine what an experience means for the persons who have had the experience and are able to provide a comprehensive description of it (Moustakas 1994:13).

This is an interpretive process, my interpretation of the interview transcripts, following the participants' interpretation of experience. It is at this point that the meaning and interpretation of the meaning of the interview text “goes beyond what is directly said to work out structures and relations of meanings not immediately apparent in a text” (Kvale and Brinkmann 2009:207). Figure 18, shows how the

clusters of relevant meaning relate to the emergent themes. Obviously this is an extract distilled from what is a much messier process, and one containing many iterations, notes, and highlighter pens. Two emergent themes are illustrated below:

INTERVIEW NUMBER: 1 PROJECT NUMBER: 1 PROFESSION: Architect	
clusters of relevant meaning:	emergent themes:
<ul style="list-style-type: none"> • new knowledge • confidence • effective working • explaining concepts • learning then teaching • collaboration - working with others • push and pull • justifying decisions • moving from theory to practice • new for engineers - learning 	<ul style="list-style-type: none"> • sharing ambition • pushing boundaries

Figure 18. An example of emerging themes: interview number 1, Architect from P1

Adopting different methodological approaches within the same study has been much discussed, a mixed or combined method has advantages but can be problematic (Teddle and Tashakkori 2013). Coffey and Atkinson argue that alternative perspectives generated by different methods cannot be summed (Coffey and Atkinson 1996:14); by looking through three different lenses at the text there is no attempt at summing but rather an unfolding of the complexity of the experiences within the text. The above extractions do not fully convey this complexity as they capture the process of analysis through one lens, the professions. A further example of the complexity of the analysis using the three lens approach, can be seen in figure 19. This captures text from the interview with two engineers on P2, and examines it from all three perspective. During the interview the conversation turned to motivations for environmental behaviours, and when asked where they thought those motivations came from one engineer said:

I don't think I'm personally driven by the kind of global carbon dioxide debate and global warming, obviously that's, that's a crucial aspect but I think on a more micro-scale, I see it's actually just about reducing waste, it's just an inherent characteristic that I've got I think (Engineer P2:2010)

The interpretation from the individual perspective picks up the engineers attitude towards their behaviour. Turning the prism through the building lens, the notion of reducing waste and not being profligate with energy has meaning. Finally, taking the perspective of the professions, the text comments on the role of the engineer, how engaging in the micro-scale can affect change and that local actions within their control impact a global problem. In this sense the interviews contained multiple meanings which emerged through the analysis, generating knowledge rather than theory. Each one of the three lenses forms the basis of chapters 3, 4 and 5 where the detail of each perspective is explored.

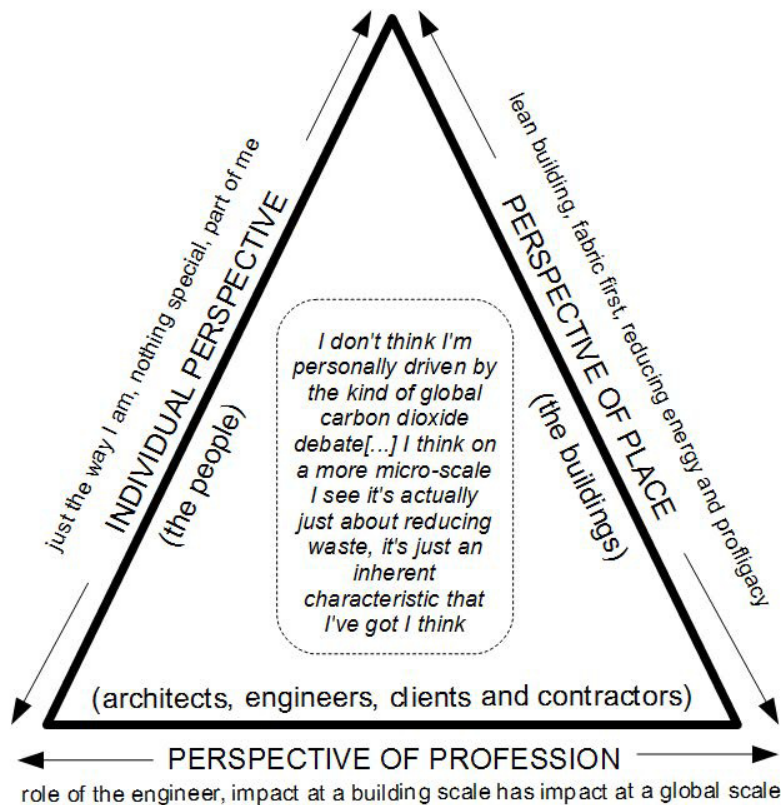


Figure 19. The three lenses of analysis applied to extract from a transcript

There are limitations and difficulties with this process of knowledge generation discussed here and these are explored in the following section.

2.4 Limitations of processes and techniques

[...] qualitative research is a set of complex interpretive practices. As a constantly shifting historical formation, it embraces tensions and contradictions, including disputes over its methods and the

forms its findings and interpretations take (Denzin and Lincoln 2013:13).

It is not uncommon in qualitative research to use intensive interviewing as a single method and, as Charmaz (2006:28) discusses, it complements other methods such as observations, surveys, and research participants' written accounts. Observation, diary keeping and written accounts were all considered either too intrusive or time consuming for the participants, or too difficult to programme into the project. It is accepted that interviews do not provide direct access to the details of how people actually perform in their work or personal life (Coffey and Atkinson 1996:19). The semi-structured interview provides opportunity for reflection on experiences, which was appropriate as that was the focus of the interview and the research aim, allowing the interviews to be as open as possible, and enabling the focus to remain on experience. Kvale and Brinkmann (2009) define this as:

a planned and flexible interview with the purpose of obtaining descriptions of the lifeworld of the interviewee with respect to interpreting the meaning of the described phenomena (Kvale and Brinkmann 2009:327)

One of the assumptions this research makes it that the knowledge is generated rather than gathered or constructed, as argued by Charmaz (2006). Kvale and Brinkmann (2009:294) provide a useful critique of knowledge generated from interviews, some of which includes the passivity of the participants, other objections to the use of the interview include epistemological criticism. Reflexively reviewing the list of criticisms is refreshing, and of course as this research is reliant on interviews, many are applicable here. Rather than take the list as a whole it is more useful to unpick the criticisms as they apply to my research, and the limitations of the processes adopted.

One criticism is that interviews are overly cognitivists and neglect action. As this research is embedded in an industry that produces a physical output, the action related to construction and the experience of construction is contained within the interviews. One of the limitations of the research is indeed that we were sitting around and talking about it, what is described in the list of criticisms as immobile. The research could have been conducted on site, through participant observation, although this would have been challenging for some professions, and programming

observations into the projects would have been complex over the various stages, the essence of reflective practice would also be removed.

Another criticism of interviews is that they are credulous, meaning everything is taken at face value, without a critical attitude. One way of tackling this could be to look at subsequent projects that the participants have worked on, comparing their actions since, and what has been published subsequent to the project completion, comparing what was said and what was done, action with rhetoric (Charmaz 2006:21). This raises the issue of taking a 'snap shot' approach, criticised and rejected by Zapata-Lancaster (2014) in favour of ethnography. Whilst in her research a longitudinal study was undertaken, including observation and field notes, my research centres on the finished project and what was learned, and in that respect a sense of snap-shot has to remain, whilst accepting that the narrative gained on that day, is of that day and would be different had it been another day, both from the interviewer and interviewees perspective. This is partly over-come by the phase two interviews, although these were limited to only four participants, but go some way in addressing Hammersley and Gomm's (2008:100) recommendation "to carry out second or even third interviews with [participants] in order to make further checks" on perspectives.

The pilot study presented an opportunity to use different techniques and processes to encourage reflection outside of the interview process, and workshops and group discussions would certainly have generated a different kind of atmosphere and dialogue, the narratives may well have remained intact. There is an additional caution that comes from conducting workshop on values, that these can very often revert to normative values being discussed within a group as no one person wishes to be seen to not want to preserve the natural world for example (Crompton 2013). What can not be known is what would have emerged had each of the eight participants in the pilot study been interviewed individually, or if the design team for each project had been in a two hour workshop. Each of these approaches, as with any variation in approach, would have produced different knowledge, a different text, although the meanings and emergent themes may have been similar, being borne out of the experiences. As discussed, space (both physical and mental) and time has an impact on qualitative research, when recall and reflection are required

(Lange 2009).

Although the techniques of conversation analysis were not specifically used (Holstein and Gubrium 2013), our experiences are clarified through other people, through conversation or discourse. The discourse relates to the lifeworld of the individuals; what words, phrases or terminology people use to describe and hence to (re)live an experience are significant. This returns us to another criticism, that interview knowledge is alinguistic, meaning that “linguistic approaches to language are few” (Kvale and Brinkmann 2009:294). This was a considered limitation within my research, where the transcripts were purposefully not sent to participants for ratification. There are robust arguments for co-producing knowledge with participants, in terms of constructing narratives (Stevenson 2013), however this approach was not followed within this research. This was a purposeful decision as part of the research design, as I wanted to focus on reflection. Rechecking a reflective commentary would have detracted from the immediacy of the research, which was important to capture, what was recalled as significant at the time. Rather than capturing a measured, edited response which may have been overly worked or reflected upon under too many vary circumstance, even shared with other. For this same reason participants were not sent interview questions in advance, only an outline of my research and my definition of environmental responsibility. Transcripts were also not sent to a third party for verification, which could have bought more legitimacy to the meaning and interpretation.

Beyond interviews, other methods were considered; observation was determined to be overly intrusive and would have presented difficulties within the time-scales of the construction projects. Observation would have taken a greater amount of time, could have potentially been difficult to conduct on a construction site and could have been overly intrusive for busy professionals. The projects selected for the research were complete, or very near completion, so there would have been little to observe in the terms of project related activity. It has also been commented that establishing learning through research is complex and observing learning would have been open to more interpretation than exploring learning through recollected experience. Fenwick points us to these problems when she writes about the issue of linking research findings:

One approach to linkage is to assume that we are all investigating different parts of the same thing (the elephant's tail, ear and trunk) and we just need to feel our way to the big thing. With learning, there is no reason to assume that there is one phenomenon with different parts, but then, there is no reason not to assume this (Fenwick 2010:90).

Written accounts, or diary keeping were thought to be overly unfamiliar for the participants. Asking for written accounts from individuals may have produced overly factual or non reflective text, diary keeping would have been onerous for the participants, and again for many involved too late in the project, as they were already complete, or their role in the project had ended. Limited written accounts of the projects are captured as extant texts, sometimes written in part by the participants. These accounts of the projects add to an overall picture, but do not provide additional insight into the experiences of the individuals. In that respect these indirect written accounts were considered of limited use as they were written for a different audience and purpose.

A small number of the participants struggled with the notion of reflection or thinking about their practice and kept turning to talk about the pragmatic issues around the project rather than identify where their motivations and values might have come from. I was expecting a lot to ask them to reflect and 'open up' about their experiences in a one hour interview. The level of reflection varied among participants and there was no common theme that those I had met before were necessarily more reflective and 'open' than the participants I was meeting for the first time. As Gillham (2005) suggests, it is partly due to the skill of the interviewer when conducting semi-structured interviews to engender a sense of conversation and to enable the participant to relax and speak freely, particularly when personal questions are being asked, in this case about ethical motivations, values, and environmental actions.

This chapter outlined the processes and techniques used in the research to generate knowledge through interviews with professionals in the construction industry. Those interviews were conducted face-to-face and via telephone; individually, in pairs and with two focus groups. There were two main phases of interviews; phase one in 2010/11 and phase two in 2014. The study has followed

the sound principles of a qualitative inquiry tradition in both the generation and analysis of the knowledge. The following chapter is the first of three examining in detail outcomes of the process described here, by focusing first on the four participants in the phase one and phase two interviews.

Chapter 3: Four People

To be human is to engage in relationships with others and with the world. It is to experience that world as an objective reality, independent of oneself, capable of being known (Freire [1974] 2008:3).

3.0 Introduction

This chapter closely documents the experiences of four of the participants through both the phase one interviews in 2010/11, and the phase two interviews in 2014, by focusing on their learning, practice, and professional positioning within the industry. This chapter is the first of three to examine the generated knowledge through one of the analytical lenses discussed in the previous chapter (see figure 20 below).

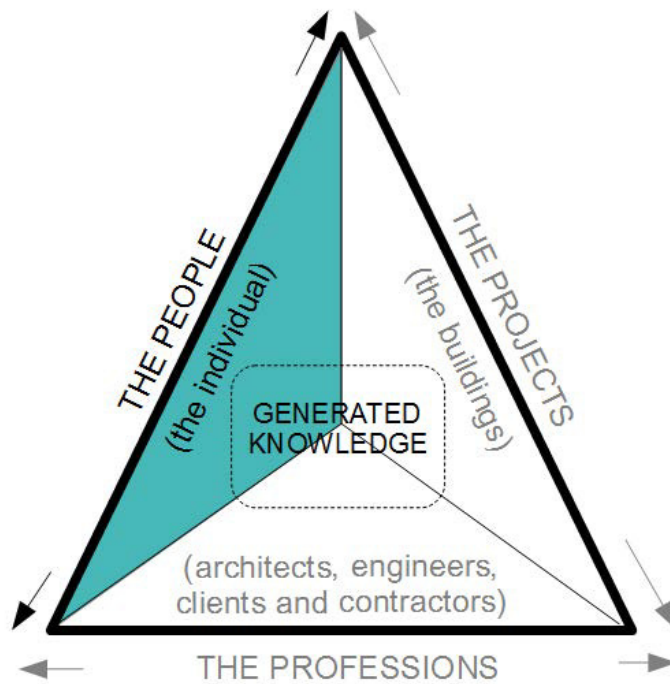


Figure 20. Focus on the generated knowledge through the lens of the individual

The phase one interviews in 2010/11 centred around the experiences of industry professionals working on one of four building projects, and included five scoping interviews (see appendix A for a full list of participants). The phase two interviews in 2014, revisited issues raised in phase one through the experiences of four of the original participants; one architect, one engineering, one contractor, and one client.

Participants were invited to reflect on the projects they had worked on, their practice, their profession, and the industry as a whole. In this way the generated knowledge discussed in this chapter is rooted in experiences within the industry as they are reflected upon over an extended period. Being mindful that this is a reflective process as Moon (1999:206) highlights “the nature of today determines what is picked up in reflection on the past”, the interviews capture two moments in time and the thoughts of that day. The phase two interviews played a crucial role in bringing a richness and depth to the research which was not present in the earlier published work based on the phase one interviews alone (Pooley 2010, 2011). As Hycner (1985:295) suggests even with a limited number of participants the results of research “can be phenomenologically informative about human being in general”, and the experiences discussed in this chapter, are woven through the following two chapters where the focus is through the professional, and then the project lens respectively.

Here each individual experience is examined in turn: the architect from project 1 (P1), the engineer from project 2 (P2), the contractor from project 3 (P3), and the client from project 4 (P4), see figure 21 below. The sampling for phase two interviews was based on those who had indicated a willingness to be reinterviewed, whilst ensuring each profession and each project was represented. Pseudonyms have been used in this chapter to help personalise the experiences and enable a clear and authentic voice to be generated throughout the text. To assist with the identification of each participant the pseudonyms are alliterative; Arthur the Architect, Enzo the Engineer, Colin the Contractor, and Clive the Client.

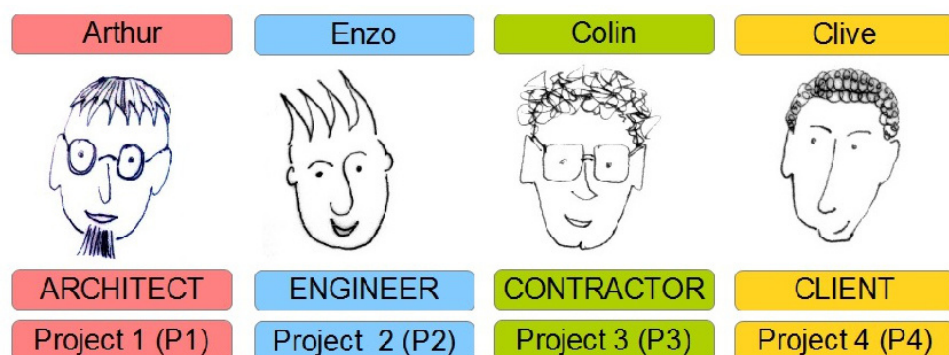


Figure 21. The four participants in this chapter

Within each chapter section there are subsections relating to the specific meaning emergent across both phase one and phase two interviews with each participant. These in-turn inform the emergent themes discussed in chapter 6. The issues discussed range from participants commenting and speculating on future professional landscapes, use of technology, and the role of legislation in industry change, to discussing issues of personal motivation, value, and perspective transformation. The exploration of learning is threaded through the interviews, sometimes tangibly, at other times this is more tangential. To this end the participants provide a personal commentary on the industry as it is experienced now, as well as exploring and possible future directions. The participants' voice is used through verbatim extracts from interview transcripts. All extracts are referenced with a participant's pseudonym and the date of the interview, as an example: "should just be a prerequisite, it's not a special thing to do" (Arthur:2010); as said by Arthur, the architect from P1 during the interview in 2010. The following section focuses on Arthur.

3.1 Arthur the Architect: Project 1 (P1)

P1 was a challenging domestic refurbishment where the architects developed new approaches to energy conservation without compromising the nature of the original house. Arthur's main focus for the project was an ambition to resolve problems he had previously encountered with poorly performing homes, this combined with an overarching personal ambition to improve housing for occupants whilst addressing environmental impacts and testing new ways of addressing these issues.

part of that I think was an interest in doing things better and trying to reach our own conclusion about what we thought sustainability was about (Arthur:2010)

Working on the project opened doors, literally and metaphorically, for Arthur and led to more work of a similar nature, larger research projects, and product development. A commitment to reducing energy consumption, and by implication reducing carbon emissions, is viewed as anything but special by this architect who does not want to be viewed as 'deep-green' but rather as someone interested in doing architecture. Taking a stance on low energy building as an architect "should just be a prerequisite, it's just pragmatic [...] it's not a special thing to do" (Arthur:2010).

3.1.1 Early experience shapes practice

Witnessing media coverage of global environmental disasters as a teenager, and growing up in an era where the nuclear arms race sat menacingly in the background, led Arthur to describe himself as being concerned as a child regarding a wide range of environmental issues and impacts. This was compounded, as he recalls, by feelings that his immediate family were not sharing or addressing the same concerns, and he admits to still berating his family for their non-environmental actions, which he describes as driving, and leaving radiators on with the windows open. Arthur does not make the link between these early childhood concerns and his chosen career, but as Ochsner (2000:203) found “many students are motivated to apply to architecture school by an idealism about the environment and a wish to contribute to human betterment”. Reflecting the argument put forward by Schultz et al. (2005:460) that the awareness of environmental problems, and a feeling of responsibility for them, brings about change in the self. However Arthur more clearly points towards the media influencing his own self-development:

... so I don't think it came from that I suppose it was more [long pause], I don't know, just a concern that I developed myself through the media I was exposed to really (Arthur:2010)

Studying alongside engineers at university and engaging in building physics gave Arthur a broad understanding of energy issues, which later helped him place his early childhood environmental concerns into a wider context. He felt university had forced him to put the numbers behind the theory and that this in turn had led him to realise that energy consumption was quite “a big issue”:

there was a sort of an understanding of energy issues, and a sort of dim understanding of what that meant in terms of carbon [...] and then you do the sums and realise it's quite a big issue. I mean, it's only recently I've come to realise how much energy we consume - vast quantities of energy we consume (Arthur:2010)

Arthur reflected on how useful working with engineers at university had proved in practice, particularly in terms of productive communication and for engineers to take him seriously as an architect. Speaking the same professional language enables you to push for what you want, without being slavish to an engineering approach (Pooley 2011), Arthur added:

... when I started working I realised that those experiences were really useful actually in terms of being able to make buildings because you could speak to engineers and they'd take you seriously and you could push engineers to get what you wanted, so at that point I realised that some of those early kind of lessons, almost kind of blackboard lessons [...] certainly had their value (Arthur:2010)

Working with engineers, quantifying impacts, and placing early emotional responses to environmental issues into a wider context whilst at university, suggests an approach to multidisciplinary within higher education similar to that called for by Hartenberger et al. (2012) within the professions. In their research into a shared professional identity across a range of built environment professions, they conclude that the professions are still struggling to integrate issues of sustainability. Arthur suggests that university played a role in integrating those issues through shared learning with the engineers, however collaboration with wider built environment disciplines was not discussed (Bradley et al. 2010).

After leaving university Arthur found himself working in situations where he felt uncomfortable about some of the things he was being asked to do. He recalled feeling that practice was not guiding or being forceful enough with clients when it came to making decisions regarding energy consumption and environmental impact. Throughout both interviews Arthur identifies the role of architecture, and of the architect, as having a responsibility to improve environmental conditions, those early working experiences were at odds with this, which led Arthur to comment that during his early working life he felt:

a bit uncomfortable about some of the things we are doing because the client, I'm not sure we are being strong enough with the client, letting him install electric heating throughout his building, this is absolutely insane (Arthur:2010)

Feeling a bit uncomfortable intensified into feelings of guilt as Arthur recounted working on certain projects. It is the dissonance and guilt that led Arthur to establish his practice with a partner:

[...] setting up ones own practice is sort of to some extent saying the jobs that are out there, practices out there, don't suit me I need to do my own thing (Arthur:2010)

With more autonomy over selection of projects and what type of work to take on, he was able to distance himself from the architecture he could not reconcile himself

with, developing an ethical approach which continues to run through his current practice. Poon and Hoxley (2010), in their work using moral theory to examine codes of conduct in built environment professional codes, conclude that deontological positioning reinforces duty of care within the process. Hill et al. (2012) explore this with references to a changing economy and by specifically drawing attention to the concept of being useful as a built environment professional in the ambition to address sustainability. These findings, based in the built environment professionals, align with Fox's (2009a:389) six categories of architectural ethics, number five being:

Physical impact upon the environment. This concern is clearly of immense importance to the future of the planet and has spawned the burgeoning field of sustainable or "green" architecture.

Arthur expresses his own moral and ethical positioning regarding environmental impact there is no desire to align with "green" architecture, and he clearly states his position as architect and his approach as architecture, environmental considerations are embedded in his professional conduct. Arthur enacts his ethical positioning through his role as an architect, not only as a professional obligation towards the client, but as an ethical obligation towards a wider community (Till 2009).

3.1.2 Learning through action

P1 represented a rapid acceleration of knowledge for Arthur and was experienced as "almost an enlightenment in terms of making" (Arthur:2010). Early intuitive feelings regarding environmental responsibility developed as a child, and reinforced through university, came to the fore:

we wanted to use the knowledge we had gained in our university education and to some extent in practice, we wanted to sort of take that further (Arthur:2010)

Pushing learning forward through research and testing, and taking radical approaches in construction and planning, helped to form a professional stance on the wider issues of sustainability in the industry, and for Arthur helped align his values and his professional behaviours (Crompton 2013; Schultz et al. 2005). Moral and ethical dimensions are crucial for Arthur, but the economics of a project also have to 'stack-up' commercially in order to satisfy professional commitments and obligations, which also shift as the industry transforms (Hill et al. 2012). The

commitment to learning through research evidenced in P1 is therefore a fine balance between: personal gain - in terms of learning, professional commitment - in terms of clients needs, and commercial buoyancy – in terms of a profitable project. Arthur's initial reaction to P1 was that “it an interesting sort of sideshow in a way, might be slightly odd” (Arthur:2010), and viewed it primarily as a research exercise (personal gain), rather than a project with architectural merit. However as the project developed, and grew to be more challenging, it helped Arthur re-contextualise early childhood and professional dilemmas, reinforcing his learning at university, and providing an opportunity to address qualitative and quantitative environmental impacts. Engaging in unfamiliar work, moving between theory and practice, and putting the numbers to issues that had previously been less well understood, had a further impact as it increased Arthur's confidence, identified as important in the process of learning and change, whether transforming or informing (Kegan 2009).

[P1] certainly made me totally re-evaluate how we, how we consider making things and that's become, I think we're much better informed and much more confident [...] that what we put forward makes sense in the round (Arthur:2014)

Whilst P1 was numerically impressive, in terms of carbon and energy reduction, for Arthur each project needs to be about more than just numbers, it is about making “spaces which hopefully affect people in some sort of tangible, positive way” (Arthur:2014), beyond energy use and environmentally appropriate design responses. The learning on P1 transformed his perspective, becoming more acutely aware of the importance of architectural decisions and the tangible effects they can have which reach beyond creating space (Seamon 2014). Arthur describes this as a project making “sense in the round”, or adopting a holistic approach to design as promoted by architects and designers over past decades (Alexander et al. 1977; Day 2004; Papanek 1995; Walker 2014).

P1 led directly to other work, these subsequent projects providing an opportunity for Arthur to refine his learning through widening his experiences. He acknowledges that even the negative experiences were useful, learning by getting things wrong, or as he described in 2014, learning by “getting burnt”. Dewey ([1938] 1997) argued that not all experience is genuinely or equally educative, and for Arthur each experience brought some form of learning, forwarding his thinking. Here he explains how important learning by experience was on P1, and highlights how the air

tightness test²⁴ was a particular turning point for all involved in the project:

I think there were decisive moments [on P1], particularly when things got tested, so when there was this air tightness test that I'd been bleating on about for months, and everybody did look at me like I was a bit of a crack-pot and I wondered if I was too, I'd never done one either, I'd only read about it in magazines (Arthur:2010)

This experience can be mapped onto Kolb's (1993) learning cycle, where concrete experience leads to formulating approaches, which leads to testing of ideas through concrete experience. Here Arthur uses it as an example which reinforced his theoretical learning through practice; the formation of abstract concepts in the learning cycle, through concrete experience – the actual doing of it, which appears to have vindicated his prior approach. The air-tightness testing process was very significant for P1, how it impacted on other members of the team is discussed further in later chapters.

Due to their work on P1 the practice became involved in a large research project, although the dissemination of this research was never as thorough as originally intended. Expressed as confounded amusement in 2014, the experience, though disappointing at the time, did not curtail Arthur's enthusiasm for continued work on reducing the energy demands of existing buildings, or detract from the value of the project in terms of research:

nevertheless we learnt a lot on that one too, and carried on chip-ping away on smaller bits on other projects (Arthur:2014)

Arthur identifies research as as important for the industry as it is for the practice, as "when we just start turning the handle we get a bit bored and it's not really what we should be doing" (Arthur:2014). For Arthur research and learning are interconnected through practice, and architects need to retain design control to enable this continued learning. He uses the analogy of turning a ship around when referring to his own practice's approach to environmental responsibility:

²⁴ A method of quantifying how much air leaks into or out of the building to check compliance with the requirements of Building Regulations NHBC. n.d. *Air leakage services - frequently asked questions*. [online]. Available at: <http://www.nhbc.co.uk/Productsandservices/ConsultancyandTesting/Airleakageservices/FAQs/> [Accessed: 11th April 2015].

[I] wouldn't say turned the ship around but we've certainly, erm, we go about things in a different way, it's quite fundamental for us (Arthur:2010)

This stands in contrast to the remainder of the industry, who for Arthur, have only gone a couple of degrees off course. Whilst there is an important role for government in funding research projects and disseminating information competently, Arthur expresses the importance of a “chipping away” at issues regardless of the size or significance of the project, making these incremental turns in his own practice and disseminating this to the wider profession.

3.1.3 Engage and change – challenges of the profession

A frustration with the architectural profession and architectural education emerges in both interviews with Arthur. Professionally, he sees architects' unwillingness to compromise as a misguided fear that addressing environmental concerns will ruin their architecture:

for most architects it just seems that it's nice to have if you can but probably if you try and do that stuff it will ruin your architecture so let's not, we don't want to try too hard [...] our architecture will suddenly be compromised (Arthur:2010)

Whilst the slow moving nature of university teaching provides an additional frustration, the important issues need to be addressed by engaging in professional behaviours that acknowledge environmental impacts:

not just in terms of any political or moral agenda but I also think it's where there is going to be a lot of work in the next 10 to 20 years, people [...] will be a lot more employable if they can be wrestling with those issues, having a notion of how those get integrated into buildings and architecture (Arthur:2010)

Arthur identifies additional professional challenges residing in the planning system, as highlighted by Farrell (2014). Having to explain design principles with each new project is “like starting from scratch to be honest, and they [the planners] look at you like you're a bit mad” (Arthur:2014). Lack of engagement by planning authorities may reflect the often conflicting demands on planning professionals (Pendlebury et al. 2014), however Arthur is committed to pushing the agenda until others engage. Hostile views found in non-professional lay organisations are disappointing, with design proposals for existing buildings meeting with a “horrendously disproportionate [...] slightly hysterical reaction” (Arthur:2014). Hill et al. (2012)

comment on this hostility, or perception of environmental development as something to view as odd or unrealistic when they write:

the immutable 'rules and laws of the free market' makes it almost impossible for the ethically grounded and normative concept of sustainable development to gain any traction as a necessary alternative or counterweight. It becomes orphaned from mainstream thinking and behaviour [...] easily dismissed as odd, not normal or unrealistic (Hill et al. 2012:11)

This reaction is not uncommon as Pendlebury et al. (2014) found in their research, where conflict exists between conservation of place and conservation of energy. This is particularly relevant to P1 and the limitations of working within planning restrictions, but Arthur also found this reaction on less historically sensitive projects. The importance of tackling energy use and carbon reduction within existing buildings has gained clarity for Arthur, even if it has yet to permeate into planning.

Acknowledging there are always going to be contractors who respond to the environmental agenda because "somebody's beating them over the back [...] with a stick" (Arthur:2014), Arthur has witnessed a positive change since 2010, and a sense that:

after a few years of just sort of going along with it they're actually embracing it a bit more positively now and saying well okay this is something worth doing (Arthur:2014)

Up until 2014 Arthur thought his practice was one of the few that understood the synthesis of design and building physics. In 2014, he found there was more of an exchange of knowledge, and that he was learning from contractors, rather than having to more closely monitor their work, or engage in prolonged discussions regarding the importance of process or intentions. Arthur recognises that this is what is needed if the industry is to change, for architects to have "a foot in both camps" (Arthur 2014), both in design and the building physics which lies behind environmental performance, as Bordass and Leaman (2012) suggest in their call for a new professionalism. In 2014 Arthur sensed a definite ground swell of change in the industry and one that he felt was not going to stop if the external pressures from regulation remain in place, which is uncertain. However, the ground swell is frustratingly slow and, if governmental intervention and support collapses any further, may well end. Moving on from his 2010 ship analogy, in 2014 Arthur had a

new analogy for the construction industry:

it's the last dinosaur isn't it, the slowest thing, you know, construction is, everything about it is a bit like stepping back about 20 years (Arthur:2014)

Arthur admits that whilst it would be nice to design new buildings, new buildings are “probably more damaging to the environment [...] so doing retrofits is probably more ethical” (Arthur:2014). With more work available in the domestic sector due to the economic downturn, as clients stay in their houses and refurbish them rather than move, Arthur realises that P1 is not destined to remain “an oddity” or “an interesting sort of sideshow” as it tackles what continue to remain “rather important” issues.

whilst it's not been completely harmonious all the way in terms of certain choices, generally [we] feel quite good about it, it feels like the sort of house that you know, we're sort of pleased to have created (Arthur:2010)

As Brook (2000) suggests, buildings are able to add to a place rather than take something away. She explores the notion of authentic and inauthentic places, suggesting we need to step outside of our cultural presuppositions in order to meet those places, and to gain an understanding of why some places 'feel' right to us. Spector (2001:80) further comments that “an architectural design decision differs from the everyday in the durability and far-reaching nature of its consequences”, and in the time elapsed between the two interviews with Arthur the far-reaching impact of design decisions made on P1 had become more evident. Even early doubts about architectural interest were slewed following the completion of the project. Despite his frustration, commitment remained unchanged:

I'd prefer just to sort of keep trying to push, push the boundaries and make sure I can, for as long as I can (Arthur:2014).

3.2 Enzo the Engineer: Project 2 (P2)

P2 was a secondary school in a semi rural location and run as a design and build contract. The ambition for the school included assessment of sustainable construction methods and dissemination of associated carbon emissions data. Expressing a clear environmental agenda personally and professionally, Enzo holds a strong position on environmental actions, current industry problems, and future

global solutions. His concerns lie with delivering the best possible solution for the client whilst minimising waste of all types. The role of the services engineer has changed over the past ten years that Enzo has been in practice and in his experience engineers are involved much earlier in projects and are having greater influence on design. Changes to professional roles, as experienced by all participants, are examined more closely in chapter 4.

3.2.1 Motivations

When first asked in 2010 where his motivations and values for environmental actions came from Enzo responded “it's just an inherent characteristic that I've got I think”. Comfortable with being himself, trusting his values, and not questioning their provenance aligns with what Hostetler (2011:85) describes when he explores the idea of good people being able to trust their values. Across both interviews, and the three and a half years, Enzo's motivation and values around eliminating waste remained consistent. For him the global carbon dioxide debate, whilst obviously crucial was, in 2010, was less of a driver for his environmental behaviour, than more local issues, a stance which remained unchanged in 2014:

I don't think I'm personally driven by the kind of global carbon dioxide debate and global warming, obviously that's a crucial aspect but I think on a more micro-scale I see it's actually just about reducing waste (Enzo:2010)

This sense that individual action makes little difference in the global debate other than acting as a good example to others, is identified by Marshall (2014) when he describes our collective inability to engage in the magnitude of issues surrounding climate change, the macro scale of the tasks and impacts are too overwhelming. Whereas for Enzo eliminating needless waste is a tangible action, where he can control the outcome: “the satisfaction I get from it [the work] is reducing waste rather than reducing carbon emissions” (Enzo:2014). This motivation lies in delivering the best possible solution for the client, addressing the use of finite world resources, and the implications for design, construction, and the wider industry. Enzo also acknowledges that “people just like the sense of a bargain” (Enzo:2014), and how clients can focus on value for money over environmental impacts. Enzo predicts this situation is unlikely to change rapidly, particularly in an uncertain economic climate. The ambition of reducing needless waste potentially has positive onward impacts for

others he works with, their perceptions, and behaviours (Evans et al. 2013).

A close working environment, and proximity to colleagues, is an important motivation for Enzo. He explains how weekly face-to-face meetings act as an opportunity to share core values, acknowledging the value of working with people with similar shared values. This proximity to colleagues has been found to be key in creating opportunity for learning particularly as it relates to environmental actions, where environmental behaviours at work and in professional life can spill over into home life, as Chapman (Chapman 2013; Chapman et al. 2013) and colleagues have found across their research:

All interviewees emphasized and agreed that the best way of learning about environmental initiatives was by actively experiencing them. Experiential learning was described as being immersed in the physical acts of 'seeing, feeling, tasting and doing' in the workplace, fostering a sense of connectedness while making the practices more acceptable, familiar and readily adopted (Chapman et al. 2013 para:20)

The size of the practice is also important for Enzo, as in larger organisations, even where those on the board have a strong environmental agenda, you have:

to try and get that all the way down the hierarchy to the lower levels where you've got [...] more of a challenge I guess, whereas small practices like ourselves we're all in the room together so its, you know, we all meet up weekly and so you know its easier to do (Enzo:2010)

Pursuing a sustainable agenda is not singularly value led, and can equally be a commercial decision about your positioning in the market, although "values have got to be behind that decision" (Enzo:2010). Revisiting these issues in 2014, Enzo reflects how his practice has "deliberately tried to keep hold of our values and our approach", remaining focused on collaborative action in what he describes as "an industry that can be quite uncollaborative" (Enzo:2014). The importance for him remains staying "open and friendly", both as professionals and as a practice, regardless of commercial pressures.

Enzo's practice continued to grow through the recession and they have not had to adjust their strategy for winning work, which is to work with clients rather than imposing a practice view, guarding against being overly dogmatic regarding any one issue. There's a similarity here with Arthur, not wishing to be viewed as 'deep-green'

or anything special, just architect or engineer. In this sense Enzo describes this role as being “a little bit like a chameleon”, being flexible and adaptive, rather than acting like “a single issue party, because [then] you only get niche support” (Enzo:2014). Enzo positions his practice between the niche and the mainstream, this is not a static position but open and flexible, adaptive to different projects and clients. This is a sentiment echoed by other participants although described differently, and is explored in later chapters.

Inevitably some projects focus on the low energy agenda more than others, it is the projects that share Enzo's personal ethos that are most enjoyable in his experience:

I think the ones that we enjoy the most are the ones with the, with the kind of low energy sustainability led ethos (Enzo:2014)

Feeling like a relative newcomer, despite having been in the industry since 2005, in 2014, almost four years after the initial interview, he described himself as a little “war weary”. There had been changes in practice, and his perspectives had shifted, ascribing these feelings to increased experience and length of time in the industry more than anything else, Enzo comments:

if my views have changed I wouldn't necessarily be able to attribute them to other factors other than the fact I've, I've had more experience (Enzo:2014)

The significance of experience in learning is critical, but here it acts as a negating force on motivation. For Enzo, with increased experience comes increased war-weariness and an over-familiarity with the problems within the industry. He comments on the importance of combating this by retaining not only interesting work, but also an interest in the work. This is highlighted by Illeris (2011) as being crucial in maintaining learning in the workplace. No matter how interesting the work, the pressures of life and work need to be balanced and this balance had shifted (Chapman et al. 2013). At the 2010 interview Enzo had recently become a father for the first time, by the 2014 interview he had a total of three children. He comments that a changing work-life balance and adjusting priorities “keeps me busy anyway, keeps me out of trouble [...] I think it also makes me want to work more efficiently” (Enzo:2014).

3.2.2 Performance and regulation

Drawing on Enzo's experience, his thoughts on future solutions as well as past mistakes, this section focuses on regulation, and how the industry has attempted to address environmental imperatives. Enzo was incredibly animated about these issues during both interviews, particularly the over emphasis on carbon, compared to the lack of emphasis on energy. For Enzo it was too easy to meet the requirements of the 2010 building regulations by plugging in low carbon technology, the emphasis needed to be on a fabric first principle:

my feeling is that the emphasis should be much more on the energy, reduce the energy first and then think about what low carbon technologies you can use (Enzo 2010).

By 2014 his opinion had changed slightly, following a further revision to Part L of the building regulations in early 2014. With more onerous regulation “you kind of have to be pretty green just to even get through the process” (Enzo:2014), legislation driving contractors to change rather than any other motivating factor. Between 2010 and 2014 Enzo worked on a Passivhaus project with a dominant focus on energy reduction in use. For Enzo it was a “ very interesting period for us, you know learning through experience on that design approach” (Enzo:2014). Learning occurring through professional practice primarily because the engineers were engaged in what was perceived as interesting work rather than routine, all the more crucial for that to learning to remain as Illeris (2011) highlights through his research with adult learners in the workplace:

if the learning is characterised by reluctance and lack of interest, the learning outcome will tend to 'appear' to us only in situations that to a higher degree remind us of the learning situation, and learning will be more likely to fade into oblivion (Illeris 2011:20)

A regulatory strategy that Enzo viewed as potentially useful was the Soft Landings framework (Bordass and Leaman 2012; Way and Bunn 2009). Although he had never seen a brief that required it and had no direct experience of working with it, he could see how, as a strategic concept, it was potentially a useful way in principle to enable learning and dissemination. Setting aside a budget to enable contractors and consultants to go back to a building was seen as an almost unachievable goal in current practice, despite the obvious benefits, Enzo comments that “it would be great to think you had time in the first two years to go back and have a nice chat with the client” (Enzo:2010), adding the “fee is gone normally half way through the

site phase” which means during the “second half of the site phase you're running on vapour”. There is often little time or money to do reflective post-occupancy work, the importance of which has been extensively documented by Leaman and Bordass (Bordass et al. 2004; Leaman and Bordass 2001) both in terms of benefits in understanding building performance and occupancy well-being, the importance of which remains under-acknowledged (Clark 2015). In Enzo's experience post-occupancy research could genuinely reduce the energy use of buildings, helping the client, design team, and engineers see what they had got wrong. One mistake Enzo identifies the industry as making is attempting to make buildings overly clever and neglecting the fundamentals of performance, what Bordass and Leaman (2012:5) refer to as “gratuitous technical novelty”.

By 2014, another key driver for change was the development of building information modelling (BIM). Hailed as an industry standard Enzo viewed it as:

a great principle, great concept [...] being honest I think it'll be years before it's used to it's full potential, probably decades before it's used to it's full full potential (Enzo:2014)

In his experience BIM was not widely used by all members of a design team. With a huge potential to assist collaboration, in 2014 his own practice was “still playing around with it to be honest”. For Enzo BIM would never replace the importance of proximity to colleagues, and what he describes as “designing properly”, here Enzo is referring to the process of design as a face-to-face collaborative act, and one that for him cannot be replaced by what is perceived as a more remote process:

I hope people don't use it [BIM] as a substitute for meetings, meeting and sketching and actually getting together, because I think that's, that's the, the successful projects are the ones where you spend a lot of time around the table together and designing properly (Enzo:2014)

As Zapata-Lancaster (2014:208) discusses in her research exploring low-carbon design tools, design is situated in a social context, where “design knowledge is created *socially and informally*”. Enzo's comments reflect the importance placed on the informal and social process of getting “around the table” to design. Issues concerning the importance of collaboration were raised by other participants and are explored further through the emergent themes in chapter 6.

3.2.3 Future communities and the global context

Enzo is facing the future with slight apprehension. This apprehension extends to his concern for the global environmental future, where he recognises that climate change and carbon dioxide emissions are a minority concern in a global context:

I read a very interesting analysis of sort of the global situation, which was saying that 90% of the world don't have time or, or they can't afford to in terms of their own personal survival, they can't afford to think about, about carbon dioxide, so in developing countries people are just worried about their own survival (Enzo 2010)

Enzo picks up on a global argument that individual actions are “a drop in the ocean” (Enzo:2010). We, in developed countries, are able to shape the future but are also unable or unwilling to recognise the catastrophic impacts of climate change and take action (Hillman and Fawcett 2004; Marshall 2014; Schmuck and Schultz 2002). whilst those in developing countries have more immediate needs concerning survival (Maslow 1968). However, Schulz and Zelenzy (1999:258) argue that “the traditional wisdom that environmental concern is a luxury afforded by only the wealthy is unfounded cross-culturally”, and so perhaps Enzo's concern over climate change and carbon being a western indulgence is a misleading apprehension.

Affordability remains an issue for Enzo, particularly with technological fixes, as only those who can afford it can buy into it. He highlights photovoltaic (PV) panels and the feed-in tariff as an example where it:

incentivises the middle class and makes the middle class feel better about themselves because they can afford it, so that's the kind of downside to it, it only ever rewards the people who can actually afford to make that upfront investment (Enzo 2010).

Enzo sees these behaviours aligning with other perceived middle class pursuits of keeping chickens and growing your own vegetables, although he concedes that it is probably “the right thing to do” he adds that it is also very fashionable, whereas people used to do it because they had to. The decisions Enzo has made regarding how and where to work, and live, reflect his values which are enacted through his behaviours (du Plessis 2013). Despite his concern that environmental impact and degradation is a middle-class western indulgence, Enzo believes developed countries should lead by example, pioneering technologies which can then be more widely adopted, “you feel like you, all be it in a small way, you can influence things and make a change” (Enzo:2010).

To alleviate global impacts, Enzo advocates the use of renewable energy technologies on a large-scale. His experiences with biomass does not lead him to consider this as a solution as it involves “committing future generations to planting more forests” (Enzo:2010). He emphasises the strength of community power generation schemes, which would “achieve a lot more than one house that just happens to have to comply with the 2016 building regs” (Enzo:2010), questioning the efficacy of regulation that specifically tackles one sector or new buildings alone. The ramping up of regulation is welcome as a counter to this problem. He re-emphasises the importance of community energy solutions in 2014, when describing a new project with the architects he worked with on P2. The new project adopted a zero carbon strategy, including renewable energy provision on a community basis which enabled Enzo to work through, in practice, issues he was exploring only in theory in 2010, testing the implications of new solutions in a new context (Kolb 1993). Enzo acknowledges there is learning ahead, as the first community heating project he has worked on “it’s not something that I’m massively up to speed with” (Enzo:2014).

Despite Enzo’s commitment to community energy generation, uncertainty around definitions of zero carbon in 2010 led Enzo to express concern that compliance could lead to “having to do silly things, like putting large wind turbines in inappropriate places” (Enzo:2010). By 2014 this was being borne out through criticisms of the ongoing lack of clarity in defining zero carbon, and in particular the introduction of allowable solutions²⁵ (*Zero Carbon Policy* 2014). Despite the uncertain regulatory landscape, Enzo’s priority remains reducing energy use and energy demand through new strategies as well as the technical challenges associated with retrofitting buildings, a particular issue where people want to retain historic features, which was also highlighted by Arthur. Enzo suggests a solution whereby a community, wishing to retain their historic buildings, could commit to a low carbon strategy provisioned on a community basis:

it makes sense to heat those buildings with a low carbon fuel, but again the efficient way of doing that is on a communal basis rather than on a house by house basis (Enzo:2010)

²⁵ Off site solutions can be used if the zero carbon targets can not be met on site (see also section 1.2.2).

Enzo's unrelenting optimism in finding solutions to many of the environmental problems faced by the industry and the wider community did not diminish, although in his experience most people appear to be mainly motivated by financial incentives rather than any other. Despite feeling war-weary, Enzo's impassioned call is for the industry and wider community to address what he describes as a global problem requiring a global solution. A slightly contradictory approach to community energy and more local solutions, and one that financial motivation alone will not answer.

3.3 Colin the Contractor: Project 3 (P3)

P3 was a large urban secondary school for a local authority. The project benefited from funding from a government initiative and included additional community facilities.

Colin “started at the bottom and worked [his] way up” (Colin:2010) after finishing university. For him working on a project with a clear environmental agenda is no different to any other job. All projects present an opportunity to learn, reflecting the heuristic nature of the construction industry and the necessity of informal education being an ongoing lifewide activity (Jarvis 2012). One of Colin's key concerns is moving the industry forward and quickly, utilising legislative routes and increasing regulation to tackle both material use and construction processes. His attitude is that if contractors are asked to do something, and paid for it, then they will do it, however other motivations emerged throughout the two interviews.

3.3.1 Making assessment meaningful

Colin's role on P3 was as project manager for the construction side of the project. He was in the same professional position in 2014, having worked on two other projects in the three years between the two interviews. Reflecting in 2014 he thought the industry had been transforming reasonably quickly until the recession stalled it. Between 2011 and 2014 money had become more important as every job was “right up against it, right from the start” (Colin:2014). Jobs were won with a zero margin, with little chance of making a profit, and Colin's company had made two rounds of redundancies prior to the 2014 interview. Despite this they had retained a

commitment to their environmental agenda, implementing an assessment and benchmarking scheme for all projects and retaining specialist sustainability personnel. Colin felt the company he worked for were very good at addressing environmental issues. In his experience taking a strong stance was something clients actively looked for:

if you're seen to be doing these things you do obviously win extra work because certain employers, you know, clients, will actually look at it and go those guys are good, from an environmental point of view" (Colin:2014)

However being seen to be addressing environmental impacts is not the same as achieving change, as Colin highlights:

we are sort of one of the best contractors at doing that [...] but whether or not we're actually achieving too much by doing that remains to be seen you know, we have to get that data and then use it in future years to say well you should be doing this, you know, we have our targets [...] but if you can't achieve your target it's not through want of trying (Colin:2011)

By 2014 in-house monitoring of materials, water, and waste was enabling Colin's company to create benchmarks:

you can work out from there whether or not you're actually doing that [...] so we can actually track and bench mark against one document so everybody knows that if you're doing a £10 million job you should create X,000 kg of CO₂, so yeah, so that's very much at the forefront (Colin:2014)

The ambition being that there is always scope for improvement on environmental performance, these principles are "very much at the forefront" (Colin:2014) of the company, retaining a realism about what can be achieved. This represents a localised way of making assessment more meaningful, to the client and to the company, as it is potentially more relevant to the workforce than existing established industry standards such as BREEAM (BRE 2014). In Colin's experience it is too easy to get certain BREEAM credits for items you have no control over, such as the project location, and he feels the mentality behind assessment needs to change. Acknowledging that some form of assessment is important, he adds that "if you are going to do it you could do it for the right reasons" (Colin:2014), beyond credits and a tick-box approach. Developers require it as a marketing tool as "if you have a building which is BREEAM excellent [...] you can rent it out at a higher rate" (Colin:2014). It can be harder for school projects to achieve a higher BREEAM

rating due to budget restrictions, conflicting ambitions, and funding requirements, and for Colin it is a waste of money which could be spent on items that are more meaningful, or have a greater impact on the performance or experience of the building.

In 2014 Colin's experience on a recent project had seen BREEAM being “pushed aside”, where the client decided against an official assessment as “there was a saving which the client took” (Colin:2014). This was the correct approach in Colin's view as it saved the client money and still delivered a project within clear environmental parameters. The duty of the built environment professional could be contradictory here, are serving the client or the wider community, or ideally both. Colin does not see this as a conflict, and that saving money on a publicly funded project is imperative, and does serve the wider community. The environmental credentials of the project were not compromised as, albeit through a self-regulating process, the contractor was still required to design “in the spirit of BREEAM very good” (Colin:2014). This self-regulating process demanded greater levels of trust from the client side as there will never be an official certified BREEAM score. This is where Colin's faith in his ability as well as the company becomes critical, with a suggestion that when it comes to environmental issues, they are better, more reliable, and can be trusted above other contractors:

in terms of what we're doing I don't think it's too much of an issue
[...] if it was a different contractor they might not be quite so [...] I
don't know, rigorous in their pursuit of the credits (Colin:2014).

Through the Housing Standards Review (DCLG 2014), the passing of responsibility for assessment back to building control or the local authority via planning is becoming more of a reality. Colin sees this as a threat as it will affect local government expenditure at a time when we are “doing our best to reduce down the level of expenditure in local authority” (Colin:2010). He questions the ability to enforce assessment, which will push responsibility back onto the contractor to “make sure we're doing it properly”; which Colin states they were doing when working “in the spirit” of BREEAM. Reliability and consistency of construction is a contentious debate that has gained more ground in recent years particularly through the potential causes, of the credibility or performance gap in building assessment,

the cause historically has often been cited as the contractors (Bordass et al. 2004; Pelly and Hartman 2013; Tofield 2012).

As there is concern with the route BREEAM is taking the industry down, there is an equal concern over the technological fixes that are introduced as a response to those assessment requirements. These technological fixes, in Colin's experience, either go out of fashion or the funding enabling them is lost. Colin cites the challenges of biomass boilers as being one such technology, as did Enzo. Biomass boilers have not proved to be a valuable environmental response to renewable energy provision or low carbon development. When new technologies fail they are soon abandoned, as Colin recalls "we put them in but all too often people turned them off" (Colin:2014). The landscape may change again as feed-in tariffs are adjusted for PV and grants for renewable heat generation remain (Nolden 2015). Colin advocates the need to examine the whole picture and balance environmental decision making; making "sense in the round" as Arthur talked about in P1. Although Colin argues for bypassing assessment in some circumstance, he sees that transparent assessment methods are required so contractors can have confidence in the processes. The assessment of biomass boilers provides an example where the financial cost and carbon emissions associated with transporting pellets needed to be balanced against reverting to using the existing gas infrastructure, which was perceived as more reliable. Profit, whilst commercially significant, is not the bottom line for Colin. He argues that environmental sacrifices would not be made for small amounts of financial saving, particularly with public funded projects, where tokenism and wasting money on technology or gadgetry with no real gain, is "just pointless [...] because we're all paying for it aren't we because it's all our money" (Colin:2011).

3.3.2 Wider responsibility

Rather than merely paying lip-service Colin feels environmental measures would be implemented more often if there was wider commitment within the industry. He illustrates this with the example of sustainable drainage systems, which ten years ago:

people would look at it and go what's this nonsense, why are you putting this in the ground [...] but now it's a given and that's what you do (Colin:2011)

Embedding systems into regulation means they are done without question, if something becomes “a given” in the industry then the technology and infrastructure required to support it develops and “it will be done properly, you'll streamline and you'll make sure it's done correctly” (Colin:2011). In Colin's experience if the technology or the system does not work, as with biomass boilers, people turn it off and revert to tried and trusted methods. Foulds (2013) makes similar observations within his research focused on environmental control technology used within the home. Colin suggests there would be more commitment to ensuring new technology works if there was either no alternative or greater investment, this would also enable costs to be reduced.

The sense of a wider responsibility encompasses dissemination of all the “good things you've done” so that people take it on board, Colin has tried to publicise areas of good practice through the company, although has found that:

whether it's engineers or architects or whoever it maybe, people use their personal experience and if they haven't done it before they're a bit reluctant (Colin:2014)

As Murray comments (2011:236), resistance is often encountered through “our perception of the external and internal barriers we have to contend with”. Self doubt, lack of confidence, and lack of experience are internal barriers and experience again plays a significant role in change and potential to transform practice (Cranton 2009; Moon 2004). Colin found dissemination of good practice and encouraging others to engage in new ways and methods of working a challenge, yet workplace learning has been found to be key in transforming established, but perhaps outmoded, practice as Fenwick et al. argue:

The basis for professional work today lies, as in previous times, in the capacity to perform work in ways that are informed, guided by and validated against shared knowledge and established conventions for practice. At the same time, it is generally recognised that the knowledge of a profession is not stable but rather contested and subjected to transformations in a continual manner (Fenwick et al. 2012:3)

Colin finds it hard to know how to make 'good' environmental decisions sometimes,

due to the complexity of the issues. The current situation requires constant questioning of the impacts of specified products, which Colin felt to be an additional burden on site managers, involving increased time, money and administration for a gain that is not immediately obvious. Beyond building assessment lies the daily difficulty of discerning between environmental claims made by specification guides and manufacturers which, for Colin, are often hard to believe asking “how can that be an A+ if you're using hydrocarbons. What's going on there guys surely that's wrong isn't it?” (Colin:2011). Many items which he describes as “great” from an environmental perspective he knows will be difficult to make pay in the future. As he struggles to make sense of it all, he concedes to relying on experience more than professional guidance:

it just comes through experience really doesn't it, kind of experience and in theory it should come from the design team down to us (Colin:2011)

Colin is equally sceptical about the experience of working in a low energy building, specifically identifying the Passivhaus method of construction as problematic in terms of occupant experience. His concern about internal conditions and “people not [...] enjoying the environment of working in there” reflects Till's (2012) argument against a technological fix that does not address what happens before or after construction, and as Foulds (2013) concludes, there can be unintended consequences of a design approach that is overly reliant on technology. Colin speculates that these buildings are:

probably not a very nice environment to sit in [...] perhaps we don't think enough about the, the people who are in that environment [...] is it the right way forward [...] perhaps we loose sight of the environment we're building in (Colin:2014)

Despite his lack of certainty in 2011 about the zero carbon agenda, uncertainty shared with Enzo, in 2014 Colin felt that targets needed to become more stringent to prevent people sidestepping aspects of regulation. Change from the client side is crucial, as Colin sees the building regulations having little impact on contractors other than compliance. Transformation of the industry has to come primarily from the client, demanding change through the brief as “it takes people who want to change things, who want to challenge it to make it happen” (Colin:2014). Clients want to pay less than they should to build something, and contractors avoid certain items to make the job affordable. It is those money saving opportunities that need to

be eliminated through rigorous enforcement. Although Colin sees the government as reluctant to enforce environmental measures as that could thwart house building. Tighter regulation or a form of regulation that works is required, but in 2014, although Colin had no idea how to achieve it, that did not make it less of an imperative in his view:

I don't know how you do it, but [...] you've got to have a higher standard of construction (Colin:2014)

Prior to interviews in 2014, part L of the buildings regulations had been recast twice, in 2010 and 2013, with a further revision anticipated in 2016. Colin believes this constant tightening of regulation is a good thing; "I think we should be doing it [...] there's no excuse for not doing it" (Colin:2014), he goes on to state that building regulations should be Europe-wide rather than UK focused, and that we should all be following the highest European standards. Aiming to exceed assessment and regulation rather than merely complying with a minimum standard.

3.3.3 Perspective

I'm quite a green person but it's, I think all too often we sort of pay a bit of lip-service to it, where we do token efforts (Colin:2011)

Having been very busy prior to the 2014 interview, and due to become a father for the forth time later that same year, sticking to being a "green person" was proving a challenge for Colin. As Dirkx (2006) found in his research with adult learners, Colin expresses his personal goals and judgements, despite the context and pressures he was working under, commenting on his environmental actions:

sometimes these sort of things depend on how much other things you've got going on in your life [...] you could rise above it and look at the bigger picture shouldn't you, but, that's what I should be focusing on [...] sometimes you sort of sit back and I look at my, I look at my children [...] you know we should have the ability to rise above it I think, lets go this extra mile to make sure things do go a lot better for the next generation (Colin:2014)

Being distracted by minor issues reflects our difficulty in approaching or facing the major ones, particularly when it comes to climate change. Marshall's (2014) arguments in this respect, around our difficulty to face the bigger issues, provides a basis for the feelings we hold toward action, and inaction, regarding environmental impacts. Colin comments on his own (in)action above, and finds the (in)actions of others equally baffling:

we've been talking about climate change since I was at school in the sort of mid 80's but even now [...] people are still questioning it [...] what's wrong with you, we've been talking about it for thirty years at least and there's still, you know, people who are doubters, you know I just find it extraordinary, I really do (Colin:2014)

During the interviews his frustration and incredulity over the lack of acceptance of climate change, and lack of action to address it was tangible.

3.4 Clive the Client: Project 4 (P4)

P4 was a developer led, innovative commercial project representing a step change in commercial design at the time of construction. Clive's role as a commercial client gives him a unique overview of the developer led landscape. Throughout both interviews Clive holds a clear position on the importance of advancing environmental responsibility within the industry, he is proud to work on projects that push the agenda forward, but recognises that the problem is insurmountable unless there is a global paradigm shift, or market forces transform the industry:

I'm not quite sure how you persuade an entire species globally to do it at the same time together because that's what you need to do otherwise it will never happen until it's too late or until the cost goes up (Clive:2010)

As Arthur did, Clive draws attention to the slow moving nature of the industry, commenting that the mere three year interval between interviews:

well that's just the development period of a building pretty much so it's not long, come back in 10 years by then we'll see (Clive:2014)

3.4.1 Re-framing

In our first interview in 2011, Clive admits to being a “bit of a non-conformist in some respects”, immediately acknowledging he is a complete conformist in many others. A self confessed “total hypocrite” regarding environmental behaviours, his views bifurcate along professional and domestic lines. Questioning the construction industry, there is an underlying personal appreciation of the importance of the conservation of finite resources:

I've always rather preferred the concept of refurbishment than knocking something down that's perfectly good anyway and re-building it, you know it always seems to me like an absolute hideous waste of resources and energy (Clive:2011)

As a commercial developer, it is perhaps understandable that much of Clive's reflection is from a market driven perspective. He is very clear in his belief that individual actions have little impact on the wider whole:

my individual consumption at home again is tiny tiny tiny tiny tiny relative to, actually this office building [...] [it is] very easy in one's mind to justify driving a big car when driving a slightly smaller car would make so little difference [...] the amount of fuel that you'd save by doing so is burnt in a few seconds in a 747 flying abroad (Clive:2011)

Clive goes on to admit that he could halve his domestic energy consumption, if he “put his mind to it”, but that we, as collective humanity, have to be compelled into action, as has been argued by Hillman (2014; Hillman and Fawcett 2004) for a number of years. Our tendency is also to follow others, regardless of the impacts of our behaviours, and often in discord with our values (Evans et al. 2013; O'Sullivan 2003). Contrary to his belief that individual action has little impact in terms of environmental outcomes, Clive feels that small collective changes in how we use buildings, such as universally turning boilers down by 5°, or halving the amount of lighting used, could have big impacts. He admits this would require a re-framing of occupant expectations, which he identifies as a collective psychological problem in a resistance to change (Kegan and Lahey 2009). He sees this spreading nationally so that collectively, we believe our impact in the UK is insignificant relative to China or America, a commonly held reason for not taking collective environmental action (Jamison 2010).

Being involved in a project that was very clear and deliberate in its environmental strategy was a steep learning curve for Clive and it raised his consciousness generally, as it was the first time he had marketed a building like P4:

I think [project (P4)] was probably the steepest point in my learning curve for sure yeah, and consciousness generally [...] you just become more conscious of the issue and more aware of technologies, more aware of what people are trying to do to make buildings greener (Clive:2011)

In this sense working on P4 advanced professional knowledge, offered an opportunity for learning, and impacted value related behaviours as Clive reflects:

I've always quite liked things that are different anyway, I've always been sensitive to the waste of our industry [...] I've always had an inclination in that direction so when we have projects like that [P4] of course it's a joy (Clive:2011)

Clive's arguments revolve around emissions and carbon use at a national and global level, "when you look at the relativities, you have to deal with big consumers, big gas guzzling consumers, factories, office buildings" (Clive:2011). The only way he can envisage a change is if carbon is understood by building users and owners, and is measured in a tangible and comparative way. In 2011 Clive felt the industry had not managed to achieved that, acknowledging the need for an improved assessment and communication tool for carbon consumption. He admitted not being "socially motivated" to want to do anything about it himself. As an influential client Clive's lack of "social motivation" to change behaviours professionally captures one of the key ongoing issues in this debate regarding personal motivation, values and behaviour, and how to motivate for change, or as Kegan and Lahey (2009) discuss how to overcome an immunity to change.

3.4.2 Building design and assessment

In 2014, reflecting on the three years since our first interview, at first Clive was not convinced anything in the industry had changed very much. The regulatory environment had "got a lot tougher" with changes to the building regulations, but despite this the desire for, what he refers to as the "glass aesthetic", had not noticeably moved on. Pushing the boundaries of design still only existed in:

isolated pockets, and there are lots of people paying lip-service to it and there are lots of developers who are building buildings and they're trying to tick the, you know, environmental boxes but they are creating big glass, big glass edifices which quite clearly are going to be energy hungry, trying to pretend that they're not because they're going to be able to get a BREEAM excellent because they're sitting on top of a tube station, quite irrespective of the fact that the air conditioning system is having to work full tilt because it's covered in glass (Clive:2014)

However, when questioned about the impact of P4 on the market Clive adjusts his perspective, and cites P4 as playing a significant role in educating the market and changing aesthetic expectations, and that strategies adopted in P4 have been taken forward to new developments and are appealing more readily to a certain sector of commercial tenants. Clive comments on this as though it was something he had not thought about before, it appeared to be the first time making that connection between the impact of P4 and development in 2014:

you know, actually funnily enough, yeah the approach to building design has changed in the last few years because people are, de-

velopers are much more, are much more willing to take a little bit of risk around creating a product that's slightly different than the kind of homogeneous white box which is what we would have typically produced before [...] and others have sort of followed suit because they want to get on the coattails (Client/agent P4:2014)

Technology may provide a fix to some of the problematic issues surrounding the perceived contradictory nature of assessment Clive outlines above, but he remains as sceptical about BREEAM as Colin, and predicts that it will become increasingly difficult to get a BREEAM excellent rating in the commercial sector:

there is going to come a point fairly soon when they won't be able to be BREEAM excellent because the part L requirements will be so restrictive that they just simply won't be able to build those types of buildings at that level, and we'll have to see how that works out (Clive:2011)

Clive describes BREEAM as “a nonsense”, as it is possible to “cheat” and get points for “all sorts of silly” things; it is a system too easily manipulated. He calls for blunter carbon calculations to measure consumption per occupant, making environmental assessment meaningful rather than incidental. It is occupant behaviour that “makes the difference, not a bit of grass on the roof” (Clive:2011).

Addressing occupant behaviour is key in building performance assessment post-completion (Bordass et al. 2004; Foulds 2013), particularly where the occupants are not paying the energy bills. This perception is to do, in part, with what Clive sees as the lack of holistic thinking, where some 'green' measures become a nonsense. As with Colin and Enzo, Clive drew on biomass as a perfect example of this. Moving in the direction of what Clive refers to as clever building design, allowing the building to work properly by providing for internal temperature variation and adaptive behaviours, such as removing suit jackets (Nicol and Roaf 2005), has to be a more appropriate way forward, requiring a change in expectation from building users, commercial tenants, and a cultural change in some sectors. In Clive's experience building occupants are increasingly viewing “green” as important, as are the general public. Buildings generally, and the construction industry specifically, are not keeping up with public aspirations around environmental impacts. Clive tempers his views by adding that in some sectors building occupiers will never:

give a hoot quite frankly how much carbon they're burning [...] as long as it [the building] ticked the right boxes and passed the test

and got BREEAM excellent, or whatever they could get themselves comfortable with before they go and put in their extra chillers, and burn thousands and millions of tonnes of carbon keeping their dealing floors cool (Clive:2011)

Energy Performance Certificates (EPCs) have started to impact the market, and Clive predicted how it was:

going to become difficult for owners [...] with very poor performing EPC buildings [...] they'll have to start doing work to bring them up to standard (Clive:2014).

This reflects his comments in 2011, where he advocated embarrassing people, and more specifically building owners, into changing their behaviours, rather than incentivising through fiscal measures, or hoping people will transform themselves.

For Clive, compulsion is the only way to rectify poorly performing buildings, and he describes it 2014 as an “interesting moment” in the industry. In his experience, the entire problem of building performance and assessment is that nobody really knows the answers. Despite having asked, on numerous occasions, nobody has ever been able to confirm for him what is more environmentally responsible – a refurbished building or a new building. Obviously the answer is complex and dependent on many factors, including building type, but for Clive this type of information is exactly what developers require “because then one could argue genuinely to reuse existing buildings and actually have the numbers to prove it” (Clive:2011). Without this numerical back-up the market dictates those decisions. Refurbishment is economically viable when rents are low and tenants are poor, they will accept a lower standard of building performance because it is cheaper. Demolish and rebuild is more attractive when rents are increasing, making new buildings more attractive to the market. Clive is aware of the complexity of the argument and adds that “the decision to refurbish or develop is not centred upon whether it's a sustainable end product or not” (Clive:2014). He reiterates the importance of addressing these issues holistically in terms of energy balancing, looking at the overall cost in energy terms, as with an electric car, you need to consider the amount of energy saved driving an electric car, compared to the amount of energy required to make it in the first place, referred to as energy returned on energy invested (EroEI).

3.4.3 Occupiers, markets and transformation

Unlike Colin, who viewed change as happening through a regulatory framework, Clive sees market transformation being driven from the bottom up, as developers respond to the demands of building users and tenants. He notes that developers, as real estate agents, cannot shape the market and that “as a developer you can't tell an occupier what they should start liking” (Clive:2011). Clients occupy a territory between providing the market with what it wants and responding to a wider agenda, where pressure on development to address environmental responsibility appears to be at odds with a lack of ability to shape the market. As Hill et al. comment:

There are also strong prohibitions that prevent valuers trying to ‘shape’ markets; valuers are allowed only to reflect them. Contrast this with the approaches found in recent UK and European Union public policy and an increasing body of regulations that require new development to carry the burden of environmental and social costs of sustainability [...] practice has not yet found a way to accommodate this (Hill et al. 2012:16)

As the recession hit, “nice things like being sustainable” (Clive:2014) became less of a priority, economic worries usurping environmental ones. As economic confidence returned, the market witnessed more sustainability focused developments and clients were delighted to acquire buildings with a BREEAM excellent rating. The quality of the wider working environment becoming increasingly significant, reflecting the importance of tenant retention. In the commercial sector tenant retention is far more significant than fuel pricing, which is an “immaterial amount of money as a percentage of the overall cost of occupation” (Clive:2011). Providing a good working environment, externally and internally, means people are more likely to enjoy going to work and in certain sectors tenants demand “space that is demonstrably sustainable” (Clive:2014). Pressure applied through corporate social responsibility (CSR) makes a difference, badging buildings with what Clive recommends as a “bloody great plaque on the front - this is a very energy hungry building” (Clive:2011) would be commercially embarrassing for developers, owners, and occupiers.

From Clive's perspective the drive to address occupant well-being remains rooted in a market economy, rather than environmental equality, as argued for by Weston and Bollier (2013). Addressing an environmental agenda beyond energy towards well-

being and happiness is suggested in the Farrell Review (Farrell 2014), in the volume housing sector initial attempts have been made to measure the happiness of residents (Bell 2013). Reliance on market forces will not bring about the environmental change required, but for Clive the issue remains one of supply and demand:

I don't think there are many who would sort of push against it [...] partly because of commercial reasons quite honestly, because it makes sense, if a building is greener it's more likely to be attractive (Clive:2011)

Clive's prediction in 2011, that gradually occupiers would become more environmentally and energy conscious was not borne-out as the financial down-turn continued. The perceived cost of compliance meant a “softening” of attitudes towards sustainability by 2014, although Clive corrects this generalisation, and adds that whilst there remain those in the financial sector that “will occupy any building that looks or feels right for them irrespective of whether it's a gas guzzler or not”, there are those in the media and creative sectors where “it has become impossible for them to occupy anything other than the best, most sustainable building” (Clive:2014) due to market perception, shareholder pressure, and CSR. The sense that “green buildings” present added value is difficult to measure (Edwards and Naboni 2013), and there may be other reasons why particular tenants in particular sectors want them. Clive has encountered “occupants who have said that they would find it easier to recruit talent of the type that they want [...] because the building is demonstrably green” (Clive:2014), and suggests that the role of the media cannot be overlooked in this respect. Clive has witnessed that if the press are talking about “reducing our energy consumption and carbon footprints then people will begin to want to behave like that because they'll want to be seen to be doing so” (Clive:2014).

One way of ensuring building occupants and tenants operate and use a building in-line with the owners environmental ambition is through what is referred to as a green lease (Langley and Hopkinson 2009). Clive highlights that green leases have yet to be used in the UK. As Langley and Hopkinson (2009) found the complexity of current lease arrangements is a systemic barrier to implementation of green leases, or as Clive phrased it, the valuers “kill it”. Cautious attempts to oblige tenants “to do the right thing” (Clive:2014) through the lease have been made but not adopted,

despite having “talked about it endlessly”. Developers do not want to take that risk with tenant retention and valuation. Responsible developers “would prefer it if their tenants could be obliged to behave in a sustainable way and consume less energy” (Clive:2014), but as things currently stand, how tenants use a building remains largely up to them, existing leases have no “teeth” regarding sanctions on energy use, as sanctions equal risk. Teeth could be introduced in the form of environmental management plans, transparency and dissemination of information, and more specific clauses in the lease relating to energy use, water, and waste (Langley and Hopkinson 2009). There are some tenant obligations embedded in the BREEAM outstanding rating, although those obligations are not particularly onerous and not readily enforceable. One way of controlling building performance post-occupation, is through technology, such as district heating systems, or adaptive opportunities such as providing operable windows (Nicol and Roaf 2005). Returning to the issues of enforceability “if a tenant wants to behave in a daft way they can, they're not going to get their lease torn up” (Clive:2014). This vicious cycle has to be broken at some point, and for Clive this will probably be through compulsion, commercial embarrassment or through an industry wide national or global paradigm shift. For Clive there will always be building occupiers in certain sectors “that don't give a toss” (Clive:2014) about environmental performance.

3.5 Summary

Focusing on interviews conducted with four participants, this chapter discussed issues that arose over a period between 2010 and 2014. By 2014 some of the concerns raised in the 2010/11 interviews had fallen away, whilst others intensified as building regulations were recast and the industry adjusted to new political and economic pressures. The knowledge generated through the interviews is both reflective and forward casting, looking to future solutions and professional landscapes by drawing on experiences rooted in the past. As participants reflect on their experiences, and their professional lives more generally, the present overlays and is contained within that past, which then bears upon an implied future.

There is evidence of learning through the interviews, some more explicit than others. Arthur's experiences clearly grew out of a conscious desire to continue

learning through research. Building on positive experiences at university, a desire to do the calculations provided a confidence to pursue theory through practice, this led to the project having a significant impact on future practice. Whereas Enzo had become war weary, possibly down to the expansion of family, although Arthur too had become a father for the first time during the interviews and was about to become a father for the second time in 2014. Despite his war weariness Enzo's commitment to his environmental values had not diluted or dissipated, the importance issues for him were proximity of colleagues and collective action.

The participants' experiences become key in their recollection and reflection, although not measurable within this thesis, reinterviewing the participants in another three years time, as suggested by some of the participants, may reveal what impact, if any, taking part in the research and reflecting on past practice has had. As the interviews with Clive reveal, there can be a sudden awakening of the impact of the project. In this way the process of participating in the research forms part of the past, the present, and the future, as the realisation of the significance of past experience on current practice influences the future.

Colin was less reflective on personal issues, and appeared to just want to get on with the task ahead, frustrations with the industry not moving in obvious directions were compounded by meaningless assessments. Colin's top down approach to change, stands in contrast to that of Clive, who would see the market changing from consumers up. Although this is a circular argument as building occupants are clients, and Colin sees the clients as pushing the agenda, it is the economic power that Clive is referring to as influencing the directionality and speed of change.

The interviews reveal that over time environmental values, and professional actions are dependent on the shifting sands of economic fluctuations, societal expectations, and personal situations. Recognition of that change within the industry is necessary in order to address environmental issues, this is a commonality among the four participants. They differ on how much of an imperative it is or needs to become, and more specifically how it might be achieved. An unfolding of difference in approaches can be elicited as each individual represents their own experiences through their profession. These tensions are discussed in the following chapter where the

generated knowledge is examined through a prosopographic lens, and inter-professional relationships are explored through the collected experiences of architects, engineers, contractors, and clients.

Chapter 4: Four Professions

professional bodies are only as strong as the actual thoughts and deeds of their members, therefore the starting point for solving this problem lies in fostering and providing conditions under which individual professionals can take personal responsibility for ethical behaviour (Hill et al. 2012:19)

4.0 Introduction

Focusing on the collected experiences of four professions; architects, engineers, contractors, and clients, this chapter explores the inherent professional tensions and collaborations within the generated knowledge as focused through the lens (see figure 22 below).

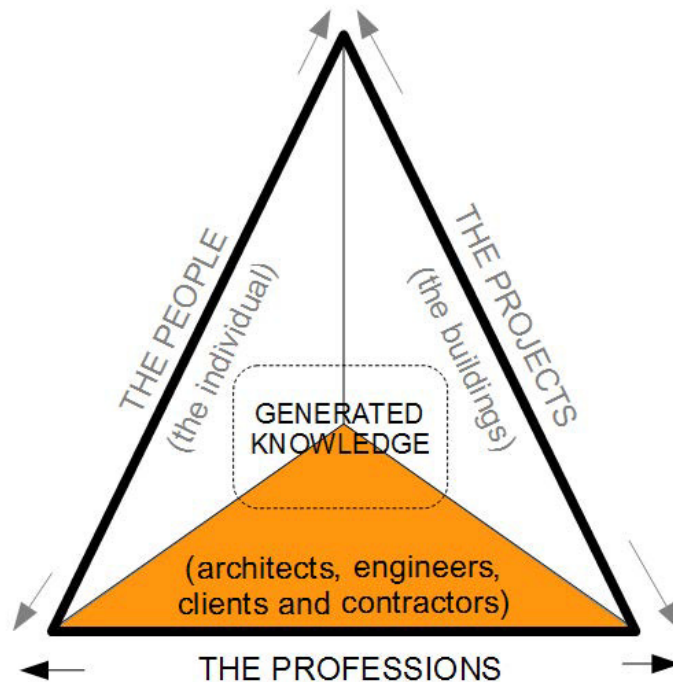


Figure 22. Focus on the generated knowledge through the lens of the professions

Divided into four sections, this chapter adopts a prosopographic approach, where the focus is placed on collected experiences within and across the four professional disciplines. Whilst Jones (2001) highlights the potential tensions and divisions in various prosopographic methods, here it is used to inform the collecting together of

personal experiences through a shared profession, rather than attempting to suggest a group biography or cohesive identity (Jones 2001).

The construction industry contains a complex and fragmented group of professions (Hartenberger et al. 2012), and the lack of interaction, cross disciplinary working, and interdisciplinary learning within the built environment has come under criticism (Chapman 2009). A significant issue uniting all four professions is the underlying frustration with the general nature of the construction industry, described variously by the participants as an industry where change is slow and led by legislation rather than ambition. As the quote from Hill et al. (2012) at the start of the chapter suggests, the starting point in addressing these tensions may well be the individual professional, but individual responsibilities and behaviours need to be scaffolded by an industry prepared to change.

As with the previous chapter issues are supported with text from the transcripts. Where direct quotes are included in the text these are referenced by the profession of the participant, the project worked on, and the date of the interview. As an example: “probably if you try and do that stuff it will ruin your architecture” (Architect P1:2010), said by the architect from project 1 during an interview in 2010. The four main projects are referenced as P1, P2, P3 and P4. The scoping projects are referenced as Sp1, Sp2, Sp3, and Sp4. Where there is more than one participant from the same profession and the same project, this is indicated with additional detail. As an example: Engineer/services P2:2010, the services engineer from project 2 in 2010. Direct quotes can be cross referenced with the the research participant list in appendix A and the interview headlines in appendix C.

4.1 Architects

Most of us spend most of our time in, near or influenced by built surroundings. We spend our lives in what were once the thoughts of architects. Today's thoughts make the world of tomorrow – an awesome responsibility (Day 2004:283).

A total of sixteen professionals related to architecture were interviewed as part of the research. Thirteen registered architects, two architectural assistants, and one landscape architect. This number is significantly higher than the other professions

as all five scoping interviews were with architects (as discussed in chapter 2), and one project interview (P2) consisting of a group of seven professionals from the same architectural practice, which included the landscape architect and architectural assistants (see appendix A). The bias towards architects is a consequence of the chain sampling technique (Creswell 2013), where architects were interviewed initially, and from those interviews further project interviews with other professions were conducted. The scoping interviews are included in this section as the contribution to the collected experiences of architects was significant.

4.1.1 Making it better

Bauman (2008) argues that architecture is disconnected, resistant and slow to change in both education and practice and suggests there are four ways of practising architecture; as innovators, technicians, business people, and genius (Bauman 2008:94). Here we can offer environmental responsibility not as a fifth way but as an ethical undergirding of all four, as embedded in the architects' code of conduct standard 5, which states:

Whilst your primary responsibility is to your clients, you should take into account the environmental impact of your professional activities (ARB 2014)

A desire to make things better ran through several of the interviews, and reflects the comments made by Arthur in the previous chapter. Motivation for entering the profession was not explored explicitly during all the interviews, although various motivations for entering the profession arose. These ranged from; a general curiosity about the world, a desire to leave an imprint on the world and a concern regarding the environment (Ochsner 2000), to one participant drifting into architecture having applied to various courses at university including zoology and pharmacy. Although the range of motivation for entering the profession varied, there were commonalities influenced by the participants. As one architect suggests during the group interview:

I think that we're just all quite inquisitive people, we're actually really interested on a personal level as much as, its a kind of mutually generated interest through discussion and just working in an environment with other people who are, who want to ask the question and interested enough to sort of push that question a little bit forward (Architect/researcher P2:2010)

Wanting to influence the future, leave a mark, push questions further and improve

conditions generally, as well as in terms of environmental responsibility, was an identifiable theme through the interviews with architects. Possibly unsurprisingly as I was interviewing architects who had worked on distinct projects that addressed a range of environmental issues, and ambitions, wanting to improve environmental conditions generally and our built environment more specifically. Indeed an awesome responsibility as Day (2004) suggests in the quote at the start of this section. This can be viewed as an intrinsic part of what architecture can be if released from what Awan et al. (2011:29) describe as the “short-term priorities of clients and the market”. The desire to make things better leads architects to be professional innovators, even though, as Penn (cited in Farrell 2014:63) highlights, they may not be very good at justifying that position. Manzini and Tassinari (2013) explore this through social innovation and agents of change and whilst they were looking at different processes, they highlight the importance of social innovation in terms of sustainable design and define it thus:

social innovation is a process of change emerging from the creative recombination of existing assets (from social capital to historical heritage, from traditional crafts-manship to accessible advanced technology), which aims to achieve goals that are socially recognized (Manzini and Tassinari 2013 para:23)

All of which could be equally attributed to the processes of architecture, and the design and construction of our built environment. The making better within this research comes from the fundamentals of making better places. Wanting to influence how we experience place could be argued to be the motive force of an architect, a desire to shape the built environment, where:

you feel like oh wow wouldn't it be great to be able to change that to actually do something positive, to make things more interesting (Architect Sp3:2010)

As Pallasmaa (2012:76) describes, architecture enables us to “settle ourselves in the world, and to place ourselves in the continuum of culture and time”. The onerousness here makes sense of the seriousness that architects place on their professional motivation, but does not necessarily point towards making it better in terms of environmental impact, unless there is an intrinsic understanding or comprehension of the continuum of the built and natural environment. Whilst environmental concerns are tangible, and manifest in an ethical drive to address them, they do not provide a singular motivation for the architects interviewed for this research:

unless I wake up at night worrying about what my children are going to be doing or what sort of world are they going to get, certainly in my professional life I don't think those are topics that I consciously think about and I still don't design that school worrying about in 30 years time potentially the flood level is going to be 2m higher then, because all the ice-caps have gone or whatever it might be (Architect/senior P3:2010)

Perhaps this does, however, point away from Lawson's (2004:261) observations that the architects interviewed for his research appeared to want to “widen rather than bridge the gap between themselves and others” suggesting that a distancing in dress and demeanour was the only means of selling their creativity, seemingly reducing the motivation for identifying difference to commodity when it could be simply a desire to make things better. The notion of distancing is discussed further in chapter 6 through one of the emergent themes, as this was an issue identified across professions, and not just architects.

4.1.2 Agency

The issue of agency is relevant throughout the research and for each profession. It is examined here in relation to the architects' experience as it was most notably commented on by architects, and by other professions in relation to architects. The interplay of architecture, agency, and values is explored by Till (2009:164) where he visualises architects acting as “open-minded listener and fleet-footed interpreter” of people's visions, he goes on to say:

This model of the architect as interpretive agent, and thus of architecture (as profession, practice, and product) as transformative agency, is dependent on a revised version of professional values (Till 2009:164).

Till (2009:165) demarcates knowledge and authority within architecture, emphasising the loss of agency can result in architectural knowledge being used instrumentally rather than transformatively. In this section it is the agency of the architect as professional that is explored. As Doucet and Cuppers (2009), acknowledge there are a disparate set of questions around agency in architecture, the focus here is on the individual and collective agency within the profession, and particularly how agency is used in determining our built environment, and the impact on wider society.

An assumption could be made that practice directors have more agency, however

tensions between responsibility, values and practice were revealed. Here one director indicates a conflict in values with practice partners, exercising an individual agency in this context, led to a project being rejected by the practice:

the only project I've absolutely turned down and said I wasn't going to do and I don't think the practice should have done it and we didn't do it in the end was [...] a holiday resort [...] with a golf course, and I just said you've got to be kidding me, I'm not even going to even consider it, its not anything I'm interested in doing [...] there was absolutely no redeeming features, there wasn't even a recession when that decision was made (Architect/senior P3:2010)

The quote above points to positioning of power, a strong ethical motivation and commitment to values by this architect, whilst also suggesting there could be future compromise if faced with financial hardship. The architect on P3 went on to emphasise that it is not enough to be value driven, having the knowledge, statistics and facts to support your decisions, is equally important. There is a distinction between the agency of architects collectively, and the agency of the individual within the profession. The architect's ability to veto the project providing individual agency in this context. This sits in contrast to another director's experience, having initially set up the practice with a clear idea of what they did not want, the practice developed over time by jointly setting the vision with staff and developing a common language. The collective agency of the staff manifests in a clear vision for the practice, where questioning is encouraged, and staff have "a healthy disrespect for authority", this senior architect and director goes on to reflect:

when we set up we kind of knew what we didn't want to be [...] now we jointly set the vision and then what we do is give a very clear environment in which people can work, the feedback when we have away days and discuss what is it we do and why and how part of it is just, most people say it's the clarity of vision [...] this is where we want to go (Architect/senior P2:2010)

Developing agency in other professions was also seen as important in enabling a change in practice, this starts to suggest an influence on the built environment professions and the direction others might take:

I think there's also a fear by builders if they don't know what they're doing, if they've never done it before they're always frightened of it, [...] if you make them do it and they understand it and then they sort of - oh, its actually easier than I thought, and it works and then once they've done it and they found it works, it's good, you know they will do it again (Architect Sp2:2010)

Witnessing this change in others, often after reflecting on a project rather than during it, made the work for architects “all worthwhile” (Architect/senior Sp1:2010). Having met with a quantity surveyor who had been sceptical of environmental measures during a project, the architect recalls a conversation where the quantity surveyor said:

I've completely changed my mind [...] at every project I'm the [quantity surveyor] that bangs on about sustainability and he said you know [...] this is morally the right thing to do (Architects/senior P2:2010 1:06:52)

In recalling this the architect is in some way justifying prior decisions and actions and placing those in the context of a changed approach in others. The quantity surveyor, through being exposed to a different way of practising has changed perspective and is now influencing others. This could be seen as the development in what Wenger (1999) refers to as a community of practice, which emphasises the importance of a professional learning community, and reflects the process of transitional learning which:

takes place not only 'in' the person, but also, to an important extent, through the interaction initiated by external people who ask for a response (Wildemeersch and Stroobants 2009:231)

Building a community of professionals is important across all four projects, where informal learning opportunities arise and where environmental behaviours can transfer through working practices (Chapman 2013). In this respect the agency of the architect, in these terms, has been crucial in transitional interactions with others within the profession, both guiding individual actions but also, as Doucet and Cuppers (2009) question the agency of the architect is potentially doing more than serving the clients, and actually guiding society towards a better end.

4.1.3 Losing ground

Retaining control over design is obviously important for architects, and is something they feel is threatened with the increased use of consultants. On smaller projects the use of additional consultants can be financially restrictive so architects have to “grapple with the numbers” (Architect P1:2010) in order to retain control. There is a perceived danger that if architects do not do this then they will lose control over projects and processes, including design decision making, to other professionals. As

Zapata-Poveda (2012) found in her research architects remained reliant on heuristics and experiential knowledge during design proposals, relinquishing the assessment to services engineers.

Experience plays a part in retaining control, as experience gained through past projects is vital in developing confidence in proposals that push an agenda forward, as they provide evidence of how new materials or techniques can work. One architect commented that project managers and in-house designers will also acquire the necessary energy and carbon knowledge and that will directly influence procurement, they may or may not use external architects and designers in the future, so it remains crucial for architects to develop their own knowledge. There is a tension here between pushing out a message and empowering others to change, as discussed in the section above, and retaining what Lawson (2004) describes as the “special knowledge” of architects and designers, enabling the retention of a position within the professional landscape that is becoming less unique. Architects identified that where there is a gap in knowledge, confidence, or experience, it is being filled by services engineers, who “re-branded themselves a few years ago as environmental engineers” (Architect P1: 2014). As Clarke observes:

Sustainability in architecture emphasizes long term thinking and the role of the architect in enabling the sustainability of our environment and society represents a significant factor and a creative challenge. Over the years responsibility for performance of a building has shifted from the architect to the mechanical and service engineer (Clarke 2013:372).

This was also highlighted in the Farrell Review (Farrell 2014), which outlined the demise of the role of the architect from 1750 to 2000, distilled in figure 23. The charts represent how what was once the prominent domain of the architect has subsequently been divided between many built environment professions, with services engineers taking an equal share of projects.

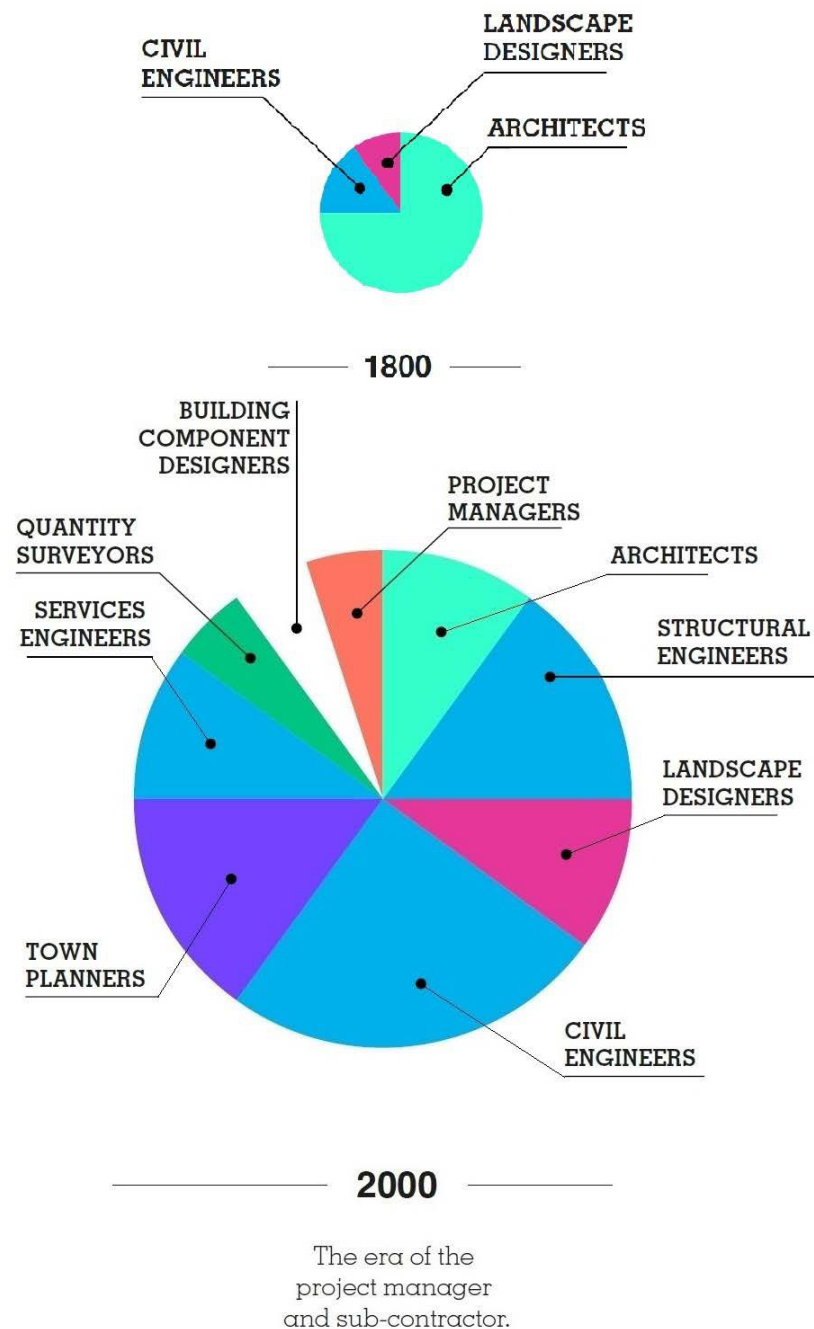


Figure 23. The era of the project manager and sub-contractor after Farrell (Farrell 2014:28)

Beyond losing professional territory to services engineers the role of the architect variously comes under threat from quantity surveyors and project managers, who have no design training. Whilst the Farrell Review remains emotive, even a little

nostalgic in parts, the sense that architects are losing ground to other professionals not trained in design is an issue that clearly resonates with the experiences of the architects interviewed in 2010 and 2014. Feeling held back, projects being thwarted, and difficulty in communicating design ambitions, compounded frustrations. This was a predominant issue for architects during reflected experiences dealing with planning professionals. These relationships were described as strained, as one architect recalled, the frustration audible as they described how the planner:

held it [the drawing] up and said I suppose you think this is really good [...] no one has ever spoken to me so rudely, actually I was just amazed and that was the chief planner, the head of the planning department (Architect/senior Sp1:2010)

Planners, whilst not threatening the role of the architect, have the ability to undermine or disregard an ambition, as another architect states:

there's not enough people with intelligence that work in planning and you get people that can only tick boxes and they come along and they say well I'm sorry that doesn't tick that box (Architect Sp2:2010)

This is also addressed in the Farrell Review, which emphasises a concern with non-design trained professions increasingly making design decisions about our built environment, and place shaping. Recommendation twelve of the report calls for “All individuals involved in making decisions about the built environment should receive basic training in placemaking and design literacy” (Farrell 2014:54), which could appear to be a rather obvious ambition to anyone outside of the industry. Hartenberger et al. (2012:62) argue for an interdisciplinary approach in higher education to foster “development of a shared cross-professional identity”; which could help to repair planning and design team relationships.

The architects experienced a growing environmental consciousness in clients, as well as contractors, particularly concerning energy. Enquiries regarding energy efficiency or internal comfort had been unusual in 2010, whereas in 2014 most enquiries were from people interested in those issues. Whilst architects may lose ground to other professions there is a need for all those involved in the industry to move forward, from client to contractor, and perhaps a letting go of some control could lead to a faster transformation of the industry:

one of the reasons the building team worked quite well is that they are intelligent people [...] they are much better read than I am actu-

ally, but one of the problems with that is, sometimes they want to introduce refinements of their own (Architect P1:2010)

This sense of losing ground spans across the industry and permeates what has been regarded as the niche of sustainable design. As one architect reflects “there's this kind of green eyed monster that exists in the world of sustainability that actually you're not as green as me” (Architects/senior P2:2010). Competition as a functioning aspect of the industry is thus viewed as having the potential to undermine collaborative working, rather than reinforcing it. The architect above goes on to say:

and I think that's a bit of [...] schadenfreude, and it's shameful actually if somebody is making steps forward then they're making steps forward, we're just lucky enough that we had the opportunity to set up our paradigm and our paradigm just embeds it, others haven't (Architects/senior P2:2010)

The disbursing of roles and responsibilities within the industry is seen as having the potential to dilute the ambition of a project through increasingly complex coordination. This issue is picked up again later in the chapter through other professional experiences, and revisited in chapter 5 through the project lens.

4.2 Engineers

Four engineers were interviewed across three projects, this consisted of two services engineers²⁶ from P2 and P4, one structural engineer from P2, and one co-ordinating engineer who had overarching responsibility for the services and structural strategy on P3. The interviews with engineers tended to focus on the detail of the projects and the offering up of solutions, not only for the project but for wider strategic environmental concerns. The majority of engineers interviewed were services engineers so the focus of this section tends to be on those issues.

4.2.1 Early involvement

Without exception the engineers interviewed valued early involvement in a project.

²⁶ Services engineers refers here to mechanical and electrical engineers, and environmental engineers, these terms vary within direct quotes from interview transcripts.

Where this early involvement had not happened, as in P2, the engineers lamented changes they were unable to make to influence the design and operation of the building. Early collaboration enables everyone on the project to gain an understanding of the brief, to make compromises, and allows for greater design input, as discussed and evidenced in the previous section. Engineers experienced their role becoming increasingly significant, and as the drive towards energy efficiency has increased “mechanical and electrical engineers are having more power within design” (Engineer P3:2010). This has placed relationships with other professionals in a delicate balance. Although this is not necessarily rooted in professional conflicts but rather individual:

some architects might get quite defensive because they think that you're just the engineer and they're the architect and it's their, their design, it depends, it's a personality led thing (Engineer/services P2:2014)

Engineers highlighted the potential for professional tension particularly between services engineers and architects, perhaps compounded by being part of the design process early in the development of a project. This tension may arise as a perceived threat to knowledge, and hence power (Till 2009). As Hill et al. note:

experience [...] also suggested that civil, structural, electrical and mechanical engineers were considerably more advanced in their thinking than most architects in their understanding of sustainability and the ethical issues it raised (Hill et al. 2012:14)

Very early involvement on P4 was a new experience for the engineer, particularly when attending an early design meeting with potential tenants. This early meeting preceded completed design drawings, so the engineers drew cartoons to explain how the building was going to work; a very rare collaboration for a speculative office building, but as Clarke (2013:380) suggests “building users are key determinants of the performance of the building and need to be considered and engaged from the outset”. An advantage of being on the design team early is that the project can become design team led, as all members understand each other and the ambition behind the project. The engineer on P4 commented on the benefits of working this way, with involvement in a project occurring “the earlier the better, because you feel you can shape the output” (Engineer P4:2011). Design influence from engineers shaping the performance of the building “even if it's just minor tweaking of a few windows, but they do make a big difference [...] they could be quite major things like turning the building 180°”(Engineer/services P2:2014).

The engineers got involved too late on P2 and they were unable to influence the shape of the plan, which would have enabled the building to operate “better”. As the engineer notes, a creative tension is borne out of different approaches in each discipline, and one that he sympathised with:

[...] architecture as a discipline is about design [...] beauty, anaesthetics, all of those things and sustainability is really a secondary consideration to them, the vast majority of architects [...] there are some architects where that statement is completely incorrect [...] which is why they're quite interesting and refreshing to work with [...] they also like to bend the rules, and I think I probably would as well if I was an architect, you want to be proud of what your building looks like don't you (Engineer/services P2:2014)

There is a suggestion above that architects are generally focused on aesthetics rather than energy efficiencies or carbon reduction, not borne out by architects. The practices that worked together on P2 (architects, services engineers and structural engineers), also recalled working on what they described as a dream project, which integrated all of the disciplines right from the very beginning. The ideal being that they were working together in a holistic way to develop a strategy for what they described as a “gem of a project”, one that unfortunately stayed on the drawing board. This illustrates the value placed on collaborative working and working with like-minded people, and was evident how enjoyable that can be.

well you know that's why we work together I think because we've got similar values and we work well together [...] commercial project at the end of the day so it has to stack up financially (Engineer/structural P2:2010)

4.2.2 Challenge and change

One development in the industry designed to increase collaborative working, and help address environmental strategies, is BIM, raised by Enzo in the previous chapter. Enzo describes it as a “great concept”, whilst suggesting that it would be many years before it is used to its full potential and that only a very small percentage of consultants are using it on a regular basis, although everyone is trying to catch up quickly. In 2014 Enzo's practice had not used BIM as a design tool and had only used it in collaboration on a project.

I think where BIM is at the moment is, generally speaking, I'd say 50% of architectural practices have got their heads round it and probably 25% of structural engineers and then maybe 5% of M&E

engineers and so finding a project where all 3 engineers, you know all 3 design team members are actively using BIM, you could probably count on one hand (Engineer/services P2:2014)

Collaboration, whether through BIM or more traditional design team meetings, was regarded as important. Overly fragmented teams have the potential to cause tensions, as this engineer recalls whilst working on a project that had two contracting teams within the same company, both with differing agendas. This created a friction within the wider team:

because one of them has said we're going to deliver a certain building, for a certain price, at a certain time, and then they just give it to the other team, so like go and do it, so there's always that sort of you know, there's always a little sort of challenge there and friction (Engineer/structural P2:2010)

Although the contractor had a strong environmental agenda, there was a tension between those dealing with the finances and those dealing with the aspirations. The importance of team cohesion was raised several times. Being part of a much bigger team provided scope for pushing things forward on P4, where the engineer valued the support from the client and working for a company with an international reputation for research, pushing knowledge forward was the agenda on the entire project (Engineer P4:2011), however this cannot be done in isolation:

having a good structural engineer a good mechanical engineer and a good architect, that's what makes the project work (Engineer P4:2011)

The architect on P4 recognised that although they had worked with the engineer before, they were “hanging onto their coattails” (Architect P4:2011). The architect felt as though his practice had “found” their way into doing things differently, whereas for the engineers it was “almost a campaign” and appeared to be important both professionally and personally.

The engineers highlighted that changes in government policy and subsidies, especially with regard to the feed-in tariff (FiT) and the renewable heat incentive (RHI), meant that those technologies had started to make financial sense whereas four years prior to the interview they had not. These changes gave engineers “a genuine incentive” (Engineer P3:2010) to install those technologies. The experience of the engineers has been borne out in a recent evaluation of the schemes which suggests a success in meeting certain targets and a distinct impact on the market

(Nolden 2015).

Adopting PV is something that is still perceived to be a good solution and assists in getting a building through building regulations. This notion of “getting through” the building regulations and compliance undermines what is evident in the experiences of engineers, which is that they are ambitious to push the agenda of environmental engineering and to genuinely improve building performance, rather than just being seen to be improving it. There is a further ambition to address holistically issues of energy conservation and de-carbonising of electricity, one that is not solely reliant on technology but sits within an overall strategy and influences design. Here sits the agency of the environmental engineer within the design process, the concern raised by architects in the previous section, as highlighted in the Farrell review.

A commonality among the engineers was the intensity of debate when discussion turned to how to transform the industry through the advancement of design and integration of low carbon technology. Key design issues arising from their experience were lighting, daylighting, and the importance of the section of the building in providing natural ventilation. One engineer cites the specification of biomass as a further example of how regulation and the lack of a holistic approach to building design and energy use can lead to dubious strategies to address carbon emissions:

biomass is not going to be the way, de-carbonising electrical energy is the only way, and the easiest way to do that is to make it as bright, to get the biggest benefit of daylighting you can (Engineer P3:2010)

Regulations sometimes distorted this ambition, where conflicting requirements, particularly concerning lighting and accessibility, had to be challenged in order to meet carbon reduction targets. Questioning the regulations and finding ways to work around them, finding practical solutions and innovating, is something that engineers felt was important and was their role, taking a common sense approach to the complex problems, and attempting to transform the industry in the process, the same engineer adds:

the problem is people don't operate the buildings the way we design them to really, we can make it super tight and super air-tight and someone just goes and leaves the window open (Engineer P3:2010)

4.2.3 Knowledge and dissemination

Services and structural engineers are guided by their respective professional bodies (outlined in section 1.2). The ISE refer to acting in the “public interest” (ISE 2015) with no specific reference to the environment, whilst the ICE state activity must be in the public good, rule 4 of their code of conduct specifically refers to the sustainable management of natural resources (ICE 2015). Within the CIBSE code of conduct members are called upon to have “due regard to environmental issues” (CIBSE 2015). Examining the collective experiences of the engineers, their actions, and understanding of environmental issues, against the background of the guiding principles of their respective professional bodies recalls the sentiment of Hill et al. (2012:19) at the start of this chapter, that professional bodies are only as strong as the “thoughts and deeds of their members”. Codes of conduct regulating the professions do not go far enough in addressing the biophysical realm and the wider environmental degradations wrought by the construction industry (Mason 2009). Although more stringent or environmentally orientated codes of conduct have the potential to push the agenda, or at least instigate more discussion on environmental responsibility within the professions, it is the experiences of the individual that we are most interested in here.

The only structural engineer interviewed felt that addressing environmental issues was less of an ambition and more of a seamless transition between who he was and what he was:

I don't know it's just, I suppose it's part of who you are really isn't it [...] I suppose we all try and do what we think is right within reason and then just put that into a professional environment [...] its expected (Engineer/structural P2:2010)

This revisits some of the more difficult questions concerning values, environmental behaviours, and professional motivations discussed in chapter 1. All the engineers interviewed talked extensively about the profession and the industry, and specifically how to instigate change through improving specifications and enabling wider dissemination of research; addressing the complexity of designing for daylight, and avoiding issues of overheating. The participants interviewed who had worked on P4 saw the re-education of the commercial market into more passive design strategies, as one of the key legacies of the project. However the engineer notes, solar shading and opening windows were omitted in the “final cut” (Engineer P4 2011), thus

compromising flexibility and adaptive opportunity for the occupants (Leaman et al. 2010; Nicol and Roaf 2005). Using passive design techniques, such as open-able windows for ventilation, improves occupant comfort and satisfaction (Bordass et al. 2004). One engineer emphasised the importance of being mindful of technology, as an increased reliance on technology within buildings has the potential to be problematic into the future. This view is reflected in recent research which found technology can be distorting to building performance and confusing for building users (Foulds 2013). Knowledge needs to be disseminated through the profession now, in order to maximise use of good practice in terms of energy efficiency in design, particularly regarding the complexities of natural and passive environmental services, as demonstrated by the omitting of opening windows in P4.

The dissemination of good practice is vital, and is gradually becoming embedded in the building regulations, particularly through the use of robust detailing²⁷, which the engineers generally thought a good idea, although one which could possibly lead to over standardisation, with a possible danger of fragmenting the building design further, rather than addressing issues holistically. As one engineer commented, over regulation, over assessment, and a lack of understanding of processes can lead to the bigger picture being lost:

I have this issue with, for instance the likes of BREEAM [...] they have a go at aluminium and say well it's not [politically correct] or, but it is, it is [politically correct] because it's created through electricity that's dumped at night [...] bauxite is no good on its own anyway so do you see what I mean, until you see the whole picture and you see how it's done it doesn't make sense to just knock aluminium (Engineer P3:2010)

4.3 Contractors

Four contractors from P1 and P3 were interviewed, these interviews were conducted in two groups of two. As with the engineers, the contractors focused on problematic current practice within the industry, and possible solutions, by reflecting on their experiences. The contractors on P1 were self-employed, whilst the contractors on P3 worked for a company. All four contractors had slightly differing roles, the uniting element being they were responsible for getting the building built.

²⁷ Robust detailing, or Accepted Construction Details (ACDs), are construction details that have been developed to help the industry achieve the performance standards required by certain elements of the building regulations (specifically Part E and Part L).

The contractors on P1 physically doing the work as well as coordinating subcontractors, whilst on P3 the contractors were managing the construction work, as well as coordinating design team information. The interviews were very conversational and very relaxed, with a lot of laughter. There was a rapport between the contractors which gave these interviews a different character.

4.3.1 Practical action

All four contractors adopted a practical approach to environmental issues, and viewed their role in addressing them as responding to the demands of the brief. Primarily their focus was on building what they had been asked to build, whether that was a super insulated wall, a rainwater harvesting system, or installing a biomass boiler. Contractors responded to what they were asked to do, then found the best way to do it, this entailed questioning the brief and the design details, and often finding alternative solutions:

we probably spend a bit too much time doing our job than other people who will just take it as read what the architects say and just carry on and they don't quite like being told [...] therefore I will just build what this guy said because then there's no issue (Contractor/site P3:2011)

This is not the case with the entire profession, as the contractors were keen to point out, they were different and felt set apart from “other people” in the profession, perceiving that they spent more time than most questioning specifications and ensuring details worked. For the architect on P1 the experience of working with the contractors was quite different, a constant questioning became a frustration.

I think scepticism is very good but that means we have to re-justify everything we do to him and to some extent to explain why we were doing those things (Architect P1:2010).

When asked about their motivation for working on a project with a clear environmental agenda, one contractor reflected that it was a moral obligation as well as an environmental one; to play your part, to do your bit, he felt compelled in his professional actions (Daloz 2000; Poon and Hoxley 2010). The contractors on P1 clearly described themselves as contrary, particularly in their ambition to embrace new ways of working:

[names colleague] and I aren't the typical, normal of the building or construction industry, so I mean we are quite, we are willing to learn and quite interested in changing (Contractor/engineer P1:2010)

There was a pragmatic as well as ethically driven approach to learning and change. For one contractor pushing the boundaries of knowledge and practice was also about remaining ahead of the competition, identifying an economic incentive as well as a moral one:

from my point of view, if I don't change and adapt to what is going to happen then I am going to be out of work. I do recycle at home, same as much as you can at home, and we recycle on the job anything that we take out (Contractor/engineer P1:2010)

This contractor was a motor mechanic before moving into the construction industry, as a mechanic you are constantly confronted with change, and he had developed a clear sense of keeping on top of technology and a shifting industry:

as a mechanic you constantly learn, I started my apprenticeship when I was eighteen [...] the cars I first started working on used to have to adjust tappets and the works, to then plugging in laptops, if you don't learn and adapt in that industry you're just kind of dead basically (Contractor/engineer P1:2010)

Contractors found it difficult to understand why wider strategies addressing environmental concerns were not more widely adopted. Required strategies appeared to be obvious and often required implementation or adaptation of existing techniques already understood but not pursued by the design team, as Bradley et al. (2010) found in their research, where skills were often reused rather than enhanced. The lack of political will (with a small p) meant that solutions for the contractors were “common sense” yet they still felt they remained unlikely to be adopted by the mainstream of the industry, although there was a clear shift between 2010/11 and 2014, as major contractors had begun recognising the need to address the importance of retrofitting for improved energy conservation.

One other contractor on P1 related to a greater social good beyond economic necessity and a sense of personal commitment, he comments, “I don't want to throw anything on the skip and say well someone else can deal with that” (Contractor/builder P1:2010). The contractors have the margin to accomplish more

and would do so if items were specified, again this goes back to finding practical solutions. It was felt that the industry could ask more of contractors in terms of environmental measures, and as contractors they would respond to this demand as that was their role. More stringent regulation is required to bring 'the rest' of the industry in line, but generally changes in regulation, whilst they have to be complied with, do not particularly impact contractors as they price what is in the contract:

as a contractor we should price what we're, you know what we do, so it doesn't really make any difference to us you know if you've got to put in, an easy example you know, if you've got to put in 150mm of insulation or 50mm of insulation we need to price at 150mm not the 50mm and it's the client who pays for it ultimately (Contractor/site P3:2014)

This attitude is dependent on contract type, with design and build contracts contractors are able to vary the specification and therefore save money. Fundamentally the sentiment of tell us to build it and we will, is a good one. The reality of the process is more challenging, and as Mason (2009) discusses is rooted in a professional ethics not always enforced. Relying on contractors to do what is required is reliant on a collective and individual ethical approach in identifying the end ambition, to reduce energy consumption, to protect local ecology, to make your company money. As Fan et al. (2001) found in their research with quantity surveyors, age, experience and seniority influence decision making when faced with an ethical dilemma. The contractors voiced concerns regarding environmental impacts, and the dilemmas they faced in terms of specification and taking a holistic approach to impact, also expressed in the quote from the P3 engineer at the end of section 4.2.

In the messy reality of construction many issues are combined, and also weighted, differently on each project. The sentiment of the contractors within this research, that they merely do what they are asked, contains much more complexity and is not consistent with other comments made about taking control, varying specifications, and researching alternative products and processes. As one contractor stated when discussing a current project "here it's design and build so we tell them [the architects] what to do" (Contractor/site P3:2014).

4.3.2 Making it work

There are two main pressures on the contractors; to make the physical building work by bringing all the sub-contractors and coordination together, and making the project work in a commercial sense, keeping both the architects and the clients happy. This is a slightly simplified way of viewing the role, as the contracting process and contract types have become more complex. Environmental measures are part of the complexity of issues contractors have to assimilate. Pultar (2000:155) argues that attitudes towards buildings are determined by two types of factors: environmental and cultural, and that ethics form the basic precepts through which professionals act in designing and constructing. Emergent in the interviews was a constant questioning through the constructing process of the designing process, and a suspicion borne out by experience, that what the design team produce, in terms of details, or instructions will not be correct as often they are details reproduced from old projects or manufacturers specifications taken out of context:

they then reproduce that, re-badge it, give it to us [...] go build that and you say no we're not going to because it's wrong (Contractor/site P3:2011).

Contractors felt that architects need to be able to compromise and come to terms with altering what they have designed, there is a need to detach yourself from that and be able to throw it away and start again if it is proved not to be right, it is important to realise when something is wrong, rather than just “keep adding patches” (Contractor/builder P1:2010). Obviously if details are wrong it can become a very expensive process to rectify, and this is why the contractors feel the responsibility more keenly to make the building work, fulfilling a responsibility to the client and the company, as well as the general public (Fan et al. 2001). This reluctance to accept the accuracy of information proves to be problematic when new ways of working or new techniques are introduced by the design team or architects. On the one hand contractors have confidence that they are capable of doing much more in terms of mitigating environmental impacts, and on the other there is a tendency to revert to tried and tested methods. These tensions, when manifested in a physical building, can be very problematic and lead to poorer performance of the building in use than was predicted in design (Bordass et al. 2004; Tofield 2012). As

Hill et al. state:

This is the major gap in the role of built environment professionals who effectively absolve themselves of any long-term responsibility or accountability for what they have designed, or whose role may be consciously or unconsciously limited by the client or other professionals (Hill et al. 2012:17).

A narrowing of responsibility due to hierarchical thinking weakens the capability for solution and cooperation (Hartenberger et al. 2012:63), and this in turn has an impact on building performance, and as Leaman et al. (2010:575) highlight the “divisions of responsibility make it difficult to close the feedback loop from building performance in use to briefing, design and construction”.

In the contractors experience the architects want to retain control, and if important aspects of the project remain unchanged then the architect is perceived to be “kept happy”. If a problem is solved, or saves money then that makes good commercial sense, not only from the contractors point of view but because the architects on one job can become the clients on another. This approach makes sound commercial sense as all the contractors interviewed have gone on to work with the same architect on other projects, highlighting one of the key issues raised not only by contractors but throughout all interviews, that of the importance of collaborative working. Confidence in others and self-confidence play a key role along with a culture of cooperation rather than blame, if everybody gets on that is how “jobs go well” (Contractor P3:2011).

4.3.3 Tried and tested

Even when there is an overarching commitment to an environmental agenda, through company statements or strategic plans, the contractors recognised there will always be instances where common sense is required, especially when you get to the construction stage. Contractors expressed that this was an issue the design team did not appreciate due to their lack of practical experience:

I like hammering nails and knocking things down and putting them back up again, [it] would be a really good idea if the people that designed these had more practical experience of actual construction (Contractor/builder P1:2010)

Three of the contractors had completed a university education prior to starting on site, and all the contractors interviewed had “come up through the tools”, starting

from the chain-man role and working through each role to a management position. This was viewed as an invaluable learning experience, where you are exposed to all of the processes (Hartenberger et al. 2012; Pooley 2015):

there's hardly anything worse when you're actually doing it but when you look back you think it was worth while because at least I know what I'm talking about (Contractor/design P3:2011)

The contractors had direct experience of the profligacy of the industry, with little regard paid to environmental impacts, particularly when it came to use of materials. One contractor recalled:

literally everything from the house would go in to the skip, and if you could set fire to it all the better because you could fill it twice [...] it was all about getting as much in as you can and making as much money as you (Contractor/engineer P1:2010)

Concerns over profligacy also extended to money, particularly where funding of certain projects appeared to be disproportionate to the general need of wider society and the perceived imperative of reducing carbon emissions globally. The implication being that designers are short-sighted and not looking at the long-term issues, that they are somehow separated from the reality of the situation (Lawson 1997), or that there is somehow an embedded vanity or perceived heroism in the work rather than a genuine desire to address energy conservation and carbon saving. As one contractor comments:

if you spent £100k on a house to get the gold star, actually you'd be far better off spending £50k on two houses for the amount of carbon you're going to save, but nobody is ever going to look at it that way because anybody who designs these things [...] wants to win the bloody competition not the war (Contractor/builder P1:2010)

The issue with a tried and tested approach is encapsulated in the quote below, where there is an assumption that new ways of working will not be welcomed by co-workers or where the reversion to a comfortable familiar working pattern is desired. One contractor, commenting on the range of people involved on a project, described a clear hierarchy on site in terms of appreciating and understanding the implementation of environmental measures:

the mechanical and electrical guys they would do, they would appreciate it but not you know not the average sub contractor [...] I think we appreciate it but you know even down to our [...] foremen and site managers they probably don't appreciate it, it makes their life harder [...] people don't like change do they people, they like to have it the same, the same from job to job, because they know what they're doing (Contractor/site P3:2011).

Contractors identified this in others, but it was not something they experienced in their own working practices, where they were willing to take on new systems and processes, and were frustrated that more was not being asked of them as those responsible for the physical construction of the building. Contractors differentiated between those who embrace an environmentally responsible approach and those resistant to change, which means that it is all too easy for the industry to always revert to a business as usual approach, where you know what to do, how to do it, how much it will cost, and how long it will take.

it almost makes it a mockery, most people think it's not worth it [...] you can make some money out of it [but] it's not really about that though is it, it's about - get it right, do it properly (Contractor/engineer P1:2010)

Problematic current practices appear in conflict with the projects the contractors had worked on, where trying to achieve improved environmental performance, or lessen impact, was undermined by the mainstream industry which remains motivated by profit rather than an environmental responsibility.

4.4 Clients

Three clients were interviewed in total over P2 and P4. It is acknowledged that the very nature of my research and the projects used implies that these may well be unique clients in some respect, particularly the developer on P4. Despite being two very different projects there were similarities between the clients on P2 and P4; the desire to push the agenda, test out new ideas, and an ambition to work with specific architects. Clients' exacting expectations of energy performance, and a clear desire to produce a new product, pushed the other professions in their responses to the brief and the project.

4.4.1 Doing the conducting

The role of the client is to orchestrate the design team, as the developer highlights on P4, having pre-selected the architects and having interviewed the contractors:

the orchestra was built properly and we were just doing the sort of conducting if you like (Client/developer P4:2011)

This was also true with P2, where the client identified an opportunity to work with an architect the local authority had wanted to work with for some time. Putting together a team is a critical role for the client, along with setting the ambition for the project. Setting the wider ambitions for these clients included a sense of collaboration and exploration, which by nature excluded a blame culture synonymous with the industry. Whilst this is not solely in the gift of the client, there was a definite sense in the interviews that the culture within a team can be developed through setting the client ambition early and clearly, an ambition which included experimentation and exploration of new techniques, instigated and paid for by the client. The significance of a no blame culture and the freedom to make mistakes is examined by Wals and van der Leij, they found that:

a culture fostering emergence must include the freedom to make mistakes. In such a culture, experimentation is encouraged, and learning is valued as much as success (Wals and van der Leij 2007:15)

Traditionally it is the client who is responsible for funding the project, in the case of P4 this was through a development company, P2 was funded by the local authority. These two funding mechanisms bring with them their own restrictions, and the commitment to a challenging building that pushes the environmental agenda has to be variously justified. In this sense the clients are risk takers, commercially P4 was a risk, which became very profitable. P2 was a risk in terms of conforming to tax payers ambitions and expectations of public funded buildings as well as the wider ambitions of the local authority, as the client points out:

in my world its the other way round unfortunately because we are spending public money [...] in my world, as I say, particularly in the environment where you're spending you know the tax payers money you need to be sure that the tax payer if you like is supporting that er that agenda and that its gone through all the measures we've just talked about you know starting with legislation and then into policy (Client P2:2010).

The client needs to bring the right team together to support the vision, and to take

bold steps, in what they perceive as the right direction. As the client on P4 illustrated, it is about being at the front of the comet, but not so near the front that you take the full force of the forward movement:

I sort of describe the green agenda as being a bit like a comet [...] a comet is effectively a body of energy that's pushing along, and at the front of that comet is somebody or something that's constantly getting bashed up and beaten up [...] then there's a ball of energy behind it, and then behind that there's a whole load of hot air and dust and rubbish, and we always wanted to be not in the front, and not in the rubbish at the back, but in that body of energy pushing it forward (Client/developer P4:2011)

In this respect working with other professions that share your ambition is critical, this team cohesion was variously described by the clients, where the environmental aspirations of the project were “almost inbred within the team” (Client/developer P4:2011), and where for the architect the aspirations appear to have “occurred to him naturally as part of his own psyche and he's inflicted it upon us” (Client P2:2010). This last quote illustrates how important it is for the client to work with other professionals with identifiable qualities that fulfill the ambitions of their project brief. At the same time it suggests that those qualities are inherently part of an individual personality, but also something that can be passed on, gifted or “inflicted” by others, but also learnt and appreciated. Murray (2013) explores this change in values through workshops with built environment students and professionals, where he develops an ethical, value led approach by encouraging individuals to view the same issue through differing perspectives.

Controlling the process is crucial, as a balance between affording freedom to experiment, improve, and develop, has to be balanced with retaining control and specifically retaining cost control. This is where the clients have to find creative solutions to conventional problems, and this can be done through contract type or through judicious use of a restricted budget. As the developer recalls, using an unusual contract type on P4 enabled them to work with the contractors early in the process, which meant the whole project was developed through the entire team:

we got them involved on what's called a two stage design and build contract, where you kind of say what's your profit what's your staff costs, get those agreed and then really you don't do the rest of the costs until later because they're part of the design team [...] but you know, you're capping their profit levels and some of the other costs and er and then you can sort of work with them and

they [the contractors] were fantastic and they really really helped make the scheme a success (Client/developer P4:2011)

The client on P2 found working with a large contracting company with a very focused environmental agenda was of great benefit. As a local authority client there was less control over appointment as they were working within a framework agreement, which once established means the team can work together on several projects over several years. As Lawson's (2004) research on architect's knowledge and processes uncovered:

[...] the designers want the client to begin the process without pre-conceptions about the nature of the solution. This enables the process to begin with knowledge about human goals, strategies and desired behaviour (Lawson 2004:26).

Whilst the clients in this research did not have preconceptions about solutions there was agreement about the importance of establishing the team and establishing preconceptions around the ambitions and ethos of the project. The three interviews with clients for this research would suggest it was the clients that posed the challenge to the other professions, rather than clients being challenged.

4.4.2 Thinking long term

Establishing a brief is very important, particularly as buildings need to address future issues as well as present ones. Long term thinking is crucial, and hence development of the brief needs to be done collaboratively with clients working with the design team early to set goals and ambitions, as illustrated in the previous section. A project will start for a client several months, if not years, before other professions get involved in the process. This usually involves identifying a site, and establishing the parameters of the project, and perhaps implementing other strategies such as decanting existing buildings. Even if the rest of the team are 'onboard' early in the process there will have been a lot of time spent from the client side prior to that point, so for the clients the project is always older than others perceive it.

The client on P2 highlights the role experience plays in setting an agenda and propagating forward thinking in colleagues:

people like myself become sort of mentally sort of aligned to those agendas through experience, its very difficult if you're not actually involved to have that same passion that you have if you, you know if you've dealt with it over years, you've seen it work you've seen the different measures adopted and they become part of your natural thinking [...] they [the less experienced staff] rely upon getting dragged along by us that have experience and I think that will always be the way in a large public organisation, it's inevitable (Client P2:2010)

This client has witnessed that without first hand experience it is difficult to appreciate the impacts of environmental measures, experience can help dispel myths and make visible that which was previously questioned leading to learning and change (Illeris 2011). Bordass and Leaman (2012) identify the importance of client commitment to processes beyond completion in order to monitor and measure buildings, ensuring building users actually understand how to operate the building. They call for clients and design teams to put more effort into understanding and improving the outcomes of their own projects. This is something that the clients interviewed had addressed on P2 and P4, through carbon calculations during construction, ongoing performance monitoring, and critical dissemination of the project outcomes in order to forward learning within the industry. Although trying to change the industry one building at a time is “just playing around at the edges” (Client/agent P4:2011) and to make significant improvements you need to take these steps at scale rather than “on a building by building basis” (Client/agent P4:2011).

There was a sense through the interviews that hostility and resistance from clients to environmental interventions or more radical solutions had dissipated slightly by 2014. In 2010 these measures were described as the “responsibility things” (Architect P1:2010) and not seen as being valued as highly by clients as other items that they were prepared to pay for. Although the clients on P1 and P3 were not interviewed as part of this research these general comments about clients are significant in the collected concept of ‘the client’, and the existence of the concept of their being a good client (Lawson 2004). As discussed through the contractors experience, the notion of spending a lot of money on environmental measures that will never be financially recouped, as the client did on P1, was questioned. Whereas on P3 the client was content to sit back from the process and not push an agenda, wanting only to ensure carbon reduction targets were met in order to secure funding

for the project overall, adopting a compliance approach. These issues are explored further in the next section and also in the following chapter.

4.4.3 Pushing a paradigm

It was the clients who were initially responsible for pushing forward on all the projects, through investment in research and development, embracing new working practices, exploiting funding streams, and putting the design teams together. Clients are generally in a position to influence working practices to a greater extent than contractors, again raising the issue of agency and hierarchy within the industry (Tofield 2012). Regardless of modern methods of construction or prefabrication techniques, for one client the industry remains by and large:

a bunch of hairy arsed blokes putting things together [...] and construction has always been like that [...] the less you can build physically on a construction site the better (Client/developer P4:2011)

Keeping as much work as possible off site for this client meant retaining quality control, freeing up of the workforce, enabling differentiation of skills, and not being held hostage to the weather, ensuring compliance on programme and cost, as well as quality. Not all clients see prefabrication as a way forward, it may only ensure reduced costs, and that learning and the 'good work' of pioneering projects, that pushed boundaries, may be lost as an economic imperative takes priority over an environmental one:

I think you know there's a big risk that as I say we'll be forced to go back down for example a modular solution route you know that is just the cheapest form of you know space that we can provide to solve an accommodation problem I think that is a big danger and therefore all the good work at [P2] could become [...] certainly diluted or even lost (Client P2:2010)

Despite working on two quite different projects, the clients on P2 and P4 were operating within equally testing commercial realities. All construction is based in commercial reality, all projects governed by a brief, everyone is answerable to funders. Pushing the environmental agenda forward against this backdrop is a challenge. The client is viewed by other professions as the generator of the project, the money and ambition behind the work, with a willingness to invest in research and development, and take risks with new technologies. As Lawson found:

It is quite normal for designers to refer to 'having an excellent client for a particular project' (Lawson 2004:23).

Client developers are now more willing to take a risk as other projects have led the way, P4 is an example of growing confidence in the market. Without initial risk taking the industry could not ride on the “coat-tails” of those new buildings that have performed well in the market. As discussed in the previous section, pushing an agenda forward relies on a willingness and commitment, often from individuals, where questioning the norm is key. Fox (2009b:23) highlights, a questioning of the existing professional roles is required, but as identified by the clients, this will be very difficult to enact in the industry unless there is a paradigm shift of significant proportions. This lack of willingness to change can be ascribed to the problem of casuistry, and how the market retains a dominant business as usual approach, and why clients, particularly risk taking environmentally committed clients, are important in instigating and guiding projects.

there isn't a developer that I know who is developing a building [...] who will sacrifice substantial profit potentially [...] in order to do the right thing in terms of creating a green product (Client/agent P4:2011).

Clients themselves recognised that there is no one issue that pushes the industry forward, that development is very sector specific, and that much of the transformation in the market witnessed to date in terms of environmental strategy is largely due to individuals pushing the agenda through their personally held values, “a business owned by an individual who happens to have a green agenda is much more likely to be green” (Client/agent P4:2011). Sectors of the market where shareholders or public bodies hold responsibility will be more responsive to media pressure and concerned with public image. In this way legislation has a role to play in incentivising procurement, and encouraging more spending on low energy demanding buildings and products, particularly in school design. However, it was felt by the clients that conventional type occupiers will probably always want to be in conventional type spaces, and these are decisions which are taken commercially not ethically.

4.5 Summary

The architects interviewed refer to acting on a value driven approach, or an ethical basis, more explicitly than the other professions interviewed. It can be argued that the architects were more open about their motivations rather than actually being more environmentally motivated, as all participants demonstrate a cognisance of the environmental impacts of the industry, and the need to challenge existing practices.

Ethical codes embedded in professional codes of conduct demand a compliance, rather than manifest a transformation. This captures a wider argument proposed by this research that we cannot legislate for change without also addressing affective, long lasting, committed action from a place of value rather than compliance (Meadows et al. 2005; Walker 2014). This requires a re-imagining of the processes of construction as well as the products (Till 2012).

The contractors appear committed yet bifurcated, wanting to pursue an environmental responsibility and witnessing their work as doing that, whilst at the same time questioning methods and details, demonstrating a resistance to change, and in some examples reverting to known methods and processes; the tried and tested. There is a confidence in the contractors that suggests we should just let them get on with it, as they know what to do, know what needs to be done, and know how to do it. However this approach is reliant on contractors who have an ethical footing in environmental issues, and as the contractors point out here, much of the industry can be found wanting in terms of environmental ethics, and are perceived not to have an ambition. The skills debate was not raised as an issue, only the potential lack of ambition and willingness to change.

Lawson (1997) argues that good design requires both divergent and convergent thinking. Each person is capable of both types of thinking, it is when this thinking occurs in parallel that it is most successful. This thinking is also required in the process of reflection, as Moon (1999:123) states “Many processes of reflection will entail periods of divergence of processing followed by convergence”. There begins to be a suggestion about personality types, approaches to thinking, and professional identities and choice of profession. These issues go beyond the boundaries of my research, and in a sense are overridden when the focus is turned back to learning

and transformation.

Interdisciplinary working and the breaking down of defined discipline barriers, with teams working towards the same goal through a shared ambition, are raised across all professions as critical aspects of a successful project, enabling learning through communities of practice. The planning profession was viewed as being apart from this collaboration, more often described as inhibiting rather than enabling. The general observation that projects go well when there is lack of conflict, when professions pull together to provide solutions, reinforces the process of design as a group activity. This may seem like an obvious need in a complex process such as construction but as is also noted through the interviews an adversarial approach has been experienced on other projects. The fact that this commentary was made regarding the collegiate atmosphere on these projects would suggest that it was more usual to experience an adversarial working environment than not. The importance of a shared professional identity and ethical framework is clear, those interviewed here enacted that through their personal and professional commitment to change, and where non-cohesive teams existed, it was harder to overcome friction. These issues are examined more closely in the following chapter, where the experiences that coalesce around the four projects are discussed in greater depth.

Chapter 5: Four Projects

a building is not a static object but a moving project, and that even once it has been built, it ages, it is transformed by its users, modified by all of what happens inside and outside, and that it will pass or be renovated, adulterated and transformed beyond recognition (Latour and Yaneva 2008:80).

5.0 Introduction

The previous two chapters focused on the experiences of individual participants, in chapter 3 reflecting over a three year period, with the collected experiences of the professions in chapter 4. This chapter explores the generated knowledge through the project lens (see figure 24 below), drawing on the reflections of the individuals who worked on those four projects. As a reification of the participant experiences, this chapter provides a critical commentary on the building projects and where they have influenced change.

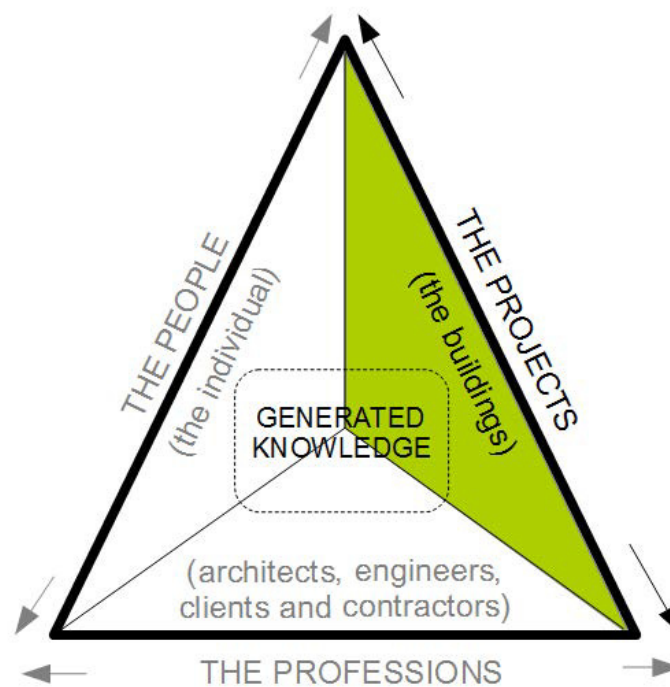


Figure 24. Focus on the generated knowledge through the building project lens

A small number of extant texts were used prior to the interviews, and on occasion during, when project documents were consulted to gain an insight into the ambitions

and design detail of each project. These texts were formed of design reports, production drawings, commercial literature, journal articles, and web sites. They did not contribute to the research outcomes, which are based on the experiences of working on each project rather than what was written about them, and are not included or cited in order to preserve the anonymity of the projects and the participants (discussed in chapter 2).

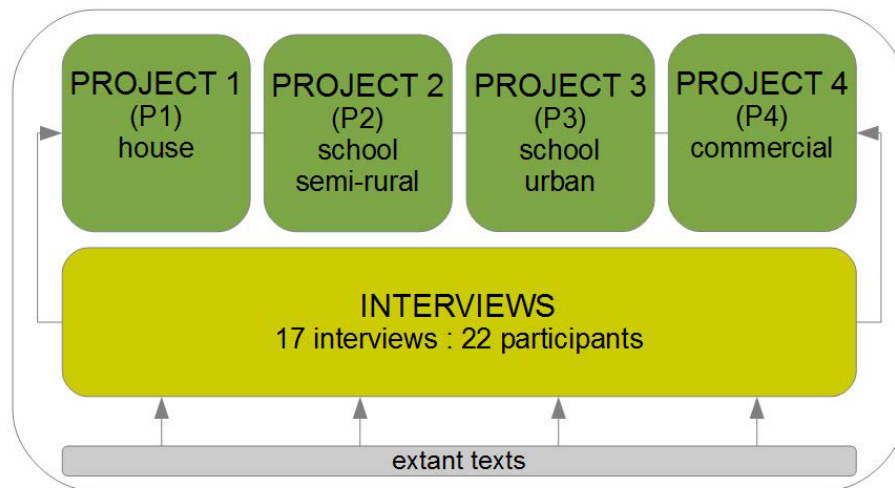


Figure 25. Projects informed by the research interviews: extant texts inform the interview

It is not the intention of this chapter to provide a commentary on each project in terms of impacts or environmental performance. Issues around building performance remain a critical underpinning of the research, with environmental ambition providing the motive force for selecting each project. As Pultar (2000) comments, there is a need for an analysis of buildings in terms of values, rather than value, and this has informed the approach taken in this chapter. A closer examination of the four projects contributes to a wider understanding of motivations for building with greater environmental responsibility. Fox (2009b) examines this through his writing on responsive cohesion and ethics of the built environment, where he calls for an ethics of building form and buildings “physical interactions with the world around them” (Fox 2009b:11). As Till (2007:2) notes:

knowledge may lie to some extent in the building, but it also lies elsewhere: in the processes that lead to the building, in the representation of the building, in its use, in the theories beyond the building, in the multiple interpretations of the building

As Latour and Yaneva (2008:80) suggest in the quote at the start of this chapter, buildings do not remain static, but are being transformed by occupants and the life within them.

The chapter is divided into four sections, each section a vignette of one of the four projects. Within each section the three research realms; learning, environmental responsibility, and the built environment, are revisited through issues specific to each project. This chapter draws on the thirteen main project interviews in phase one and the four interviews in phase two, these two phases of interviews include twenty-two participants. The scoping project interviews are not included in this chapter as they do not provide a commentary on the four projects. As in chapter 4, direct quotes from interview transcripts are referenced by the profession of the participant, the project they worked on, and the date of interview. Where there is more than one participant from the same profession and the same project this is indicated with additional information. The participants in this chapter can be cross referenced with the participant data in appendix A and the interview headlines in appendix C.

5.1 Project 1 – House

P1 was a challenging refurbishment of an existing house, and explored the potential of reducing carbon emissions by 80% in line with 2050 targets. This technically demanding project required a revised approach, where tried and tested methods were no longer applicable. As we have seen in the previous two chapters during P1 methods were questioned, new understandings formed, and perspectives transformed (Mezirow 2000a). The three participants interviewed, from a core project team of four, variously commented on the ambitions of P1 and identified where and how working on the project had contributed to their learning. Working on the project influenced practice and led to other, similar projects. Some aspects of P1 remain unique and unreproducible, as one contractor commented:

you're never going to get another job like that [...] the job we are working on now, which is a housing association job, you can't go to that level and we're on a budget this time and we have the architects saying I want this to be better than before (Contractor/builder P1:2010)

5.1.1 Research

The predicted growth in the construction industry, coupled with existing poorly performing housing, make for difficulty in meeting the carbon emissions reduction targets of 80% (relative to a 1990 base line) by 2050 (UNFCCC 2014b). Although the predictive figures vary, it is accepted that the majority (80%) of current housing that will be occupied in 2050 has already been built (Jha 2010), and whilst low energy targets for new build housing are vital, it is equally critical to tackle the environmental performance of existing housing through energy conservation (Chalmers 2014), contributing to reducing emissions and assisting people out of fuel poverty (Boardman 2010). P1 was an attempt to address the government targets for zero carbon dwellings (*Zero Carbon Policy* 2014), through refurbishing existing stock rather than building new housing.

Feeling as though there would be limited architectural scope in the project, as already discussed, P1 presented an opportunity to test principles previously only explored in theory. The project was able to proceed with confidence as there was clear commitment from the client:

the client seemed very certain that the low energy aspect of it would be taken through, that is why we took the job on, we took it on as a learning exercise really as an opportunity to do some research (Architect P1:2010)

Significantly reducing energy consumption was the key driver for the client, who was also prepared to make the necessary investment to achieve it. The architect recalled this was a project where the client:

wanted to transform it, [the client] didn't just want us to just wave a little bit of candy floss at it and prove it; [the client] really wanted to see how far you could go and I think when we started saying we might get a 60%, 70% reduction [...] that galvanised them into saying, well we'll spend more money than we thought we would [the client] had to put his money where his mouth is (Architect P1:2010).

As one contractor observed “there was no compromise, [if] it costs £20 to save a micro joule of energy, then spend £20” (Contractor/builder P1:2010), and commented further on the uniqueness of the wider ambition and opportunity P1 presented. In this respect P1 was more than a financial investment on the part of the client, it was an investment in research and learning for all involved, as the

financial investment was unlikely to ever be recouped through energy saving alone:

there's no point in spending £250k on renovating a property that ultimately is only going to be worth £250k once it's finished, and not going to bring in that much more you know, you work out how much it is going to cost to pay-back for all that (Contractor/builder P1:2010)

The architect and contractors were presented with clear learning opportunities throughout the project. For the architect this was a conscious decision, to view P1 as research, for the contractor it was challenging, an experiential learning opportunity, where the learning was simultaneous with the construction. When reflecting on the process, the contractors and architect were able to reassess what was important, and became more aware of the consequences of their decisions, particularly in terms of energy consumption and the wider environmental impacts. This led the architect to re-evaluate the role of architecture, and in particular the importance of making existing buildings more environmentally responsive, which became increasingly apparent following the completion of P1. This sense of responsibility extending beyond energy reduction alone:

I still want to build complete buildings but part of me, having done this project and become much more familiar with [...] making an impact on carbon reduction, if you spend the rest of your career just working on existing buildings it's probably the right thing to do (Architect P1:2010)

One contractor was initially sceptical of the environmental focus, and the processes and technology required to reach the levels of air tightness demanded. Having undertaken a lot of research into new techniques and methods during P1 he recalled, wryly, spending as much time on a dust proof laptop researching products as actually carrying out the construction work. However, the time invested in this additional research informed and changed his practice, and led to more work with the same architect. The architect reflected that P1 was “a remarkable job” (Architect P1:2010), it continues to influence the work of the practice and those working in the practice. It has equally contributed to the wider profession through dissemination of good practice and lessons learnt:

actually it's sort of quite important stuff and to some extent that has brought us other work of the same sort of ilk which a couple of years ago we'd have thought that we weren't really interested in doing (Architect P1: 2010).

5.1.2 Perception

The quality of light, sense of freshness, thermal comfort, and feel of the house were important in making P1 a home, rather than just an energy efficient house:

the great benefit on a winters day, you sit here with just a very short burst of gas in the morning you're warm all day, you feel really comfy and the air's fresh and it's clean (Architect P1:2010)

The thermal transformation in the physical properties of the house were sensed by the body “working in there in the snow I had to take my overalls of it was so hot” (Contractor/engineer P1:2010), something that both Heschong (1979) and Pallasma (2012) draw our attention to, the measuring of a building viscerally, rather than visually or statistically, added another dimension to the learning for those involved:

We perhaps describe the house as an experience not just as a set of numbers, it's how it feels, it's not just a number, it's not just a SAP [calculation] or anything [...] the benefits of how you feel too, that's one of the things that I've really learnt [...]. You start off here in the snow and you come inside and it just feels comfortable (Architect P1:2010)

The experience of the house demonstrates a preoccupation not only with energy but beyond energy, as Bachelard discusses, “A house that has been experienced is not an inert box. Inhabited space transcends geometrical space” (Bachelard and Jolas [1958] 1994:47). For P1 that experience also transcends assessment in statistical space. Sensing space in this way, addresses the affective realm of built form, as the architect goes on to comment “it feels like the sort of house that, you know, we're sort of pleased to have created” (Architect P1:2010). The architect is feeling the house, is sensing the success of the energy conservation measures, beyond the air tightness testing and the low U-values. The success of the house becomes more than the sum of its energy performance and low impact parts. Despite the difficulties with planning, and the initial reluctance of the contractor to engage in new methods of working, P1 did change habits of mind and the impacts rippled through the industry with new products being manufactured as a result of the challenges faced.

The project became more than the “sideshow” the architect at first feared it would remain. The ambition to make measures in P1 unremarkable rather than remarkable pushed the project, with learning feeding into other projects, all enabled by a client who was willing to push the agenda and fund the necessary research. P1 demonstrated that by making an existing building more environmentally appropriate you “make it usable”:

ultimately the only way you can keep something like [a] grade two listed obviously or something that is in a conservation area is to make it sustainable, make it usable [...] there's no point in keeping it the way it was in 1920 you just can't use it like that it's not viable (Contractor/builder P1:2010)

5.1.3 Practice

The research required on P1 had a direct impact on practice, with one contractor's perspective changed after witnessing an air tightness test. The contractor, previously sceptical about the process “came on-board” following the test on the house, where you were able to “put your hands in places where workmanship wasn't great and [...] feel the air rushing through it” (Architect P1:2010). Learning through this somatic experience was a pivotal moment in the project, and one that changed perspective and practice, particularly for the contractor, who by 2014 had completed a course and purchased the equipment to conduct their own air tightness testing, as the architect comments:

[...] so he can now do his own airtightness testing, so that's almost complete, complete reversal actually, because when we, when we were doing the testing on [P1] he really just thought it was a load of nonsense and told everybody you know [laughing] whereas now he's a qualified tester [...] it's amazing really (Architect P1:2014)

The air tightness test became more than merely a function of the project, and is significant for those experiencing the test, and those witnessing the change in others. Here the architects witnessing a “reversal” in the approach of the contractor, which was obviously significant and unexpected, and is described as amazing. Interestingly, during the 2010 interview the contractor talked a great deal about solutions to many of the environmental issues faced by the industry, and did not mention air tightness testing during that interview. It was the architect who highlighted the experience as being significant for the contractor's practice, and arose during the second phase interview with the architect in 2014, emphasising the

value of reflection over time and the phase two interviews. The process of air tightness testing can be seen as a disorienting dilemma, the first stage in Mezirow's (1991) 10 stages (discussed in section 1.3.4), however there is no continuation through the stages, and indeed as others have argued there does not need to be or seem to be a sequential move through the stages of perspective transformation (Dewan 1993:167, cited in Taylor 2000:291). The contractor's change in perspective, can equally be viewed as a clear expression of experiential learning, where concrete experience leads to testing the implications of new concepts in new situations (Kolb 1993). These issues are explored in more depth in the following chapter where the emergent themes are discussed.

This air tightness testing event reinforces the architect's ambition to transform the perceptions of the profession to a point where the interventions viewed as being remarkable on P1, become unremarkable, and become "just architecture". Rather than being "shocked and awed by the fact that there is this much insulation in the wall" (Architect P1: 2010), increasing levels of insulation to address building fabric performance need to become standard and viewed as "just sensible" (Architect P1: 2010). A further change took place for the contractors during installation of the mechanical ventilation and heat recovery (MVHR) system, which at first felt complicated and counter-intuitive, as "a lot of it didn't make a lot of sense to us in certain ways" (Contractor/engineer P1:2010). Having learnt from what was initially a frustrating experience, one contractor later fitted a similar system in his own home.

The contractors were able to contextualise what they were doing in terms of energy conservation and environmental impact within the project, placing the impact of their actions within the context of the mainstream construction industry remained in doubt, however:

I don't think that what we're doing is going to change the planet tomorrow but I think if we keep doing it then other people will eventually have to follow [...] we can prove that it ends up being kind of [...] economically viable to change (Contractor/builder P1:2010)

This statement above aligns with comments made by the other contractor working on P1, who remained doubtful that change across the industry would follow, and that the industry as a whole did not see a benefit in changing practice.

Although the extensive demolition on P1, and some of the other more radical measures, were unique to the project many of the less radical measures found their way into other projects and have been more widely adopted, as the architect comments:

I think we all still feel it was the right thing to have done on this house because it [...] allowed us to work the plan and make the spaces work better [...] there's still lots of other things in the house that we've fed onto other projects which, some of which involve no demolition at all (Architect P1:2010)

Necessary corrections made during construction, compounded by what the contractor saw as a lack of practical understanding by the architect, and the contractors' constant questioning, caused dilemmas to be resolved through reflection and experiential opportunity. The transforming of perspectives and professional practice in this way, reinforces theories that suggest all learning is transformative (Cranton 2006; King 2005), whilst at the same time acknowledging the distinction between information and transformation in terms of developing professional knowledge (Kegan 2000). In this respect P1 remains significant in disseminating learning and informing practice for those who worked on the project as it enabled both the architects and the contractors to work on further projects with similar ambitions. For the wider industry the significance was in the products and solutions that were developed as a result of the challenges faced on P1, and then adopted by a wider audience. The second project the same team worked on together proved quicker as new ways of working had already been explored and developed through P1, as one contractor attests:

there's loads of stuff we learnt from [P1] [...] the stuff that we're doing now we're doing stuff we'll go - oh, we can do this we can change this, we can do this, you know we're still thinking of different ways, so if we do another one we'll probably be quicker again (Contractor/engineer P1:2010)

Developing confidence and increasing experience opened up a “new road” (Architect P1: 2010) for the practice, with new clients and a significant role in a large research project, helping to explore the principles first encountered on P1.

5.2 Project 2 – School semi-rural

This local authority secondary school for approximately 800 students, was designed to BREEAM very good, and administered through a design and build contract.

Additional funding for the school was secured through a commitment to reduce carbon emissions by 60% (on building regulations at the time). Ambition went beyond BREEAM assessment to address wider issues of environmentally appropriate construction, with pioneering embodied carbon research funded by judicious use of a tight budget. Dissemination of this research to the local and wider community became a crucial aspect of P2.

5.2.1 Vision

P2 was one of a number of schemes the client had worked on since 2004. This, combined with over fifteen years prior experience in the industry, which fed into the development of the brief from the client side. Despite this extensive experience, the architect felt the local authority client was struggling with the concept of designing an environmentally appropriate building:

to be frank they were struggling with what does it mean to try and design a more environmentally appropriate building hence doing workshops with them (Architect/senior P2:2010)

The architect had previously conducted a series of workshops with the local authority which led the client towards an ambition of wanting to work with the architect on a future project:

we were very impressed obviously you know with [the architect's] strong drive towards sustainability, we'd sort of [...] pencilled in any suitable opportunity that we would like to, to work with [the architect] and you know, through his knowledge and experience you know expand our [own] (Client P2:2010)

The opportunity eventually arose via P2 when, following an interview process, the architects were appointed through a framework agreement. This was a significant appointment as it enabled the client to access the “knowledge and experience” of the practice, across more than one project, and potentially over a number of years:

in some cases we're on frameworks where we're dealing with [the] same people for years and years and years and we've been able to influence, I think, in a positive way the culture and the behaviour of those organisations that we deal with (Architect/project P2:2010)

The local authority client had a clear ambition, as did the school, where they wanted to develop a brief that matched their educational vision. It was this strong educational culture that the architects worked with, offering the school an understanding and interpretation of their educational ambition, rather than a built

solution. It was in taking this more radical approach that the architects felt was instrumental in them winning the job:

we looked more at their educational vision and, and the work that they'd done on certain workshops beforehand about setting the brief [...] we're not just saying that we've got a solution here today but we will continue to work with you to find the solution (Architect/project P2:2010)

The contractors were also keen to try new ways of working, prompting engineers to explore new technologies, they remained open-minded regarding solutions to some of the environmental issues P2 aimed to address. Having led the research and learning in the early stages of the project, the engineers noted that the contractors eventually reverted to the original, and cheaper, solution. The engineers' role on the project was limited in this way, and they did not go on to design the building systems, but rather focused on strategies for daylighting and natural ventilation, and explaining the parameters of heavy weight and light weight construction.

This limited research by engineers fed into the overall strategy for P2, aspects of which were adopted by the client in later projects. These were aspects such as wind turbines, biomass, and thermal mass, what the client referred to as the “hard measures”. This was largely a subconscious act on the part of the client, acknowledging the experience of P2 and working with the architects had not explicitly influenced decisions on other projects but that the learning on P2 had remained:

sitting in your memory [...] there to call upon when you're debating what you should and shouldn't do with any one particular element of design, that comes through doesn't it, without it being actually so obvious [...] I don't think its quite like that, I think your intelligence and your requirements of the scheme evolve almost by stealth (Client P2:2010).

This type of subconscious, sometimes subtle and internalised, transformation is what Dirkx (2000, 2001a; 2006; Manzini and Tassinari 2013) refers to in his research where, drawing on Jungian theories of individuation, he questions the overtly cognitive processes of other learning theories. Here, the client brings forth the subconscious into the present, and goes on to express concern that this crucially important learning process, whether subconsciously or consciously taken forward, is in danger of being lost as funding is cut and as local authority projects are forced to revert to a business as usual approach. Although Tofield (2012) found

that Passivhaus schools do not necessarily cost more, and provides two examples in his report, there is still a perception that a BAU approach is more cost effective.

5.2.2 Constraints

The architects, accepting that you have to work with constraints rather than within them, comment on the use of the structural steel frame on P2:

[P2] it's a design and build project as opposed to traditional so there are routes down which we wouldn't choose to go necessarily but you, you work with the materials that are offered (Architect/project P2:2010)

The architect goes on to describe how the section through the building became more important than the structural fabric, natural ventilation and daylighting representing continuous savings on energy and carbon emissions, a manifestation of the engineers input into the design strategy. Despite the architect's emphasis on the importance of the natural ventilation and daylighting strategy, the services engineer felt coming later to the project had limited their influence:

if we had been on board when they were sketching a section of the building and thinking about the overall form, I think there was a lot that we could have done to improve it actually, so it comes back to [...] our role becoming important increasingly early (Engineer/services P2:2010)

The challenges faced in persuading the contractor to use environmental products could be viewed as a constraint, however the architects' refusal to be channelled away from what they see as fundamentally important, required these constraints to be tackled rather than accepted. An example of this is the specification of the green roof on P2, which was eventually achieved by the architects offering to pay for it themselves, not an unusual occurrence in the practice as the architect comments:

I describe it as the [practice] cheque on the elastic band erm that hopefully we can get it to ping back at us [...] if you're talking about £3,000 difference [...] then on a secondary school we will make the pitch to pay for it, that has psychological impacts that levers a response from others and often we don't write cheques, we did sponsor part of the roof [...] we are actually committed to this we, we will write cheques [laughing] (Architect/senior P2:2010)

The landscape architect elaborates on a crucial issue regarding ease of installation, and how the practice “managed to find a green roof system that came in grid format where you can just pick up the pieces of green roof [...] anyone can lay it”

(Architect/landscape P2:2010). This modular system avoided the complexity of a bespoke roof and use of a specialist contractor, and as the roof came in sections the school were able to raise additional money to fund it, with parents, contractors, and the architects all sponsoring sections - "a pixel funding project" (Architect/senior P2:2010). Where the practice encountered resistance, as in the example of the green roof, they found creative solutions (Bauman 2008), constraints imposed by the contractor, through the design and build contract, were worked with rather than within and an unconventional solution found. These types of solutions are not uncommon in the practice, where commitment to environmentally appropriate construction, beyond rhetoric, runs through the ethos of the practice. This is demonstrated both through their commitment to research and a preparedness to invest resources in moving the debate forward through physical engagement with environmental impacts, and as with P1 furthering product development.

the research part of what we do is very important, it's not just knowledge gathering its actually academic research often with uni-
versity partners (Architect/senior P2:2010)

Research and dissemination play a crucial role in overcoming constraints for the industry as a whole, as highlighted in the Construction 2025 report (HMGovernment 2013a). Generating and furthering knowledge in this way develops a better informed industry:

it's not about trying to indoctrinate them just trying to you know
positive outcomes everybody recognises and next time around
they might think slightly differently (Architect/senior P2:2010)

5.2.3 Carbon

The client on P2 was particularly interested in establishing the embodied carbon of the project, and this research was funded through creative budget allocation:

[the client] said, we've got a budget for an interior designer do you
do interior design? and we say well we kind of do that anyway [...]
then they were interested in the embodied carbon and they said
what can we do, erm, so we made a proposal and in the end they
said well if you can work out the interior design and the embodied
carbon as one thing, and we said OK that's fine (Architect/senior
P2:2010)

The carbon calculations were aligned with the construction process, which meant that as materials were ordered the embodied carbon was calculated and the information posted onto a website. In this way the research and dissemination was

dynamic and responsive, and by ensuring the information had relevance to the curriculum, was also very student focused. The sharing of embodied carbon information had unforeseen consequences:

a lot of the work is done in actually getting hold of those numbers, but the other [work] is to then contextualise them, to actually put that into a an appropriate form that was key stage educationally relevant and that could be used, and things started to happen, nothing to do with embodied carbon but they er the school and the contractors had a recycling competition [...] the students were measuring how much paper by weight they recycled and at the same time the contractors were publishing their data (Architect/senior P2:2010)

The contextualisation and dissemination of information through the website, revealing the calculations rather than leaving it as a black box process, required transparency and enabled learning. This emphasis on transparency of process and outcomes carried through the entire project. The recycling contest between the contractor and the school was particularly successful, and could be described by what Fowles (2000) refers to as transformation to ownership.

what we were trying to do was to, instead of the school to be kind of behind a hoarding in which you might get to see it three or four times during its build, is that the pulse of the build actually comes through the educational activities, and more often than not we're offering hooks for that to happen (Architect/senior P2:2010)

However, Selby argues that change is about strength and resilience rather than restrictive programmes that focus on “the waste hierarchy, recycling, or biodiversity in the playground or on the campus” (Selby 2002:90), that this goes against what our “ecological understanding” is telling us. This is not the experience of those working on P2, where a programme of recycling, a competition, in the playground had the potential to build future strength and resilience within the community.

The nature of the embodied carbon research and analysis was something the client had not seen on a project before, and in 2010 they were sceptical about ever seeing it again due to the demise in funding. Funding plays a critical role in enabling research, which in turn moves the discussion forward. The client acknowledges that the scale of P2 helped support the carbon work:

I think there's a scale of scheme that actually can support those sort of, you know, that work and there's a scale of scheme that can't unfortunately, I think that's the reality (Client P2:2010)

The embodied carbon research came too late in P2 to impact the specification, but contributed to debates within the office and provided much needed benchmarking data on school construction for the profession generally. Whilst this type of research is vital, pushing that out to a wider audience is equally vital, particularly in an industry that has been criticised for not effectively capturing learning and disseminating research (HMGovernment 2013a).

Change within the industry is influenced by many factors and as Clarke (2013:370) suggests, change oriented towards environmental responsibility cannot rely on technology or market forces alone; it is the experiences of building and the construction process, that also impacts learning and change. As Day (2004:283) highlights “we spend our lives in what were once the thoughts of architects”, it is those thoughts of architects and the other professionals in the design team, that manifest in built form. Buildings are about more than their physical architecture, taking a broad, holistic approach towards design meant that P2 worked as a school building, but also as an educational tool during construction, revealing the process for students, staff, parents, and the wider community (Clarke 2013).

it's not all about architecture [...] that's potentially a moment, a photographing opportunity, but it's about the life of the building, the culture of the building (Architect/senior P2:2010)

5.3 Project 3 – School urban

This local authority school was designed to cater for 1200 students, including community facilities. The school benefited from additional funding through two government schemes; one to assist regeneration, the other to encourage carbon reduction in use by 60%, the same funding mechanism as P2. P3 consisted of building a new larger school within the existing school grounds whilst the existing school remained occupied. The original school was demolished when P3 was completed. The onerous site constraints, along with a limited budget, led to some difficulty in retaining all aspects of the environmental strategy.

5.3.1 Making it mainstream

It was the ambition of the architects, rather than the clients, on P3 to push environmental issues further into the mainstream. The aim being to move what is too often described as environmental architecture “to be architecture [...] this is just what we should do”, what any “good architect should consider” (Architect/project P2:2010). With ambition driven by the architects, the client was content to abide by the requirements of the funding, which was for the project to achieve a BREEAM assessment rating of very good and meet the 60% carbon reduction target. As the project architect notes, one assessment method does not necessarily address all aspects of a project:

we put together a sustainability agenda, which was key issues which we wanted to develop and which we thought was a response to the clients original brief [...] and that was all put in right at the outset and it included increasing the thermal envelope by 30%, from past experience that achieves both the BREEAM credits under the energy section there, erm but also helps give a very good EPC and carbon emissions are good (Architect/project P3:2010)

In addition the architects and contractors wanted to demonstrate a route to BREEAM excellent:

[the] client decided not to go for excellent because it would set a precedent for other school buildings that they're doing [...] the contractor team were being very open with us and they were behind the scenes targeting excellent [...] the client didn't want to pay any extra, we didn't get excellent, but it's very very very good [laughing] (Architect/project P3:2010)

This importance for public funded projects to have environmental ambition is commented on by the contractor, where local authority clients in particular play a key role as “until they do it other people won't will they” (Contractor/site P3:2014). Commitment is required from government to create demand (HMGovernment 2013a), how this is achieved in practice remains less clear, as the UK faces increased austerity measures. It is not a perceived lack of skill or knowledge that thwarts achieving greater environmental responsibility, but rather a lack of ambition.

[the client was not] interested because they didn't have to do it and probably couldn't have afforded it anyway [...] at the time in order to get government funding you had to get very good so that's what we aimed for (Architect/senior P3:2010)

Technological solutions also need to be made more viable. When discussing the use of PV cells on P3 the engineer comments that “in real terms it's daft but until people are forced to invest in that technology, the technology stays expensive and doesn't come down” (Engineer P3:2010). Beyond making a contribution to the overall carbon reduction strategy, use of PV was important in terms of raising awareness and increasing market demand:

it could have probably saved us a bit more, a bit more energy, and would have made a statement, because it was visible [...] if there was £156,000 worth of PV cells on the roof, and you look at it every day then you get used to seeing it (Engineer P3:2010)

An over reliance on technology does not necessarily bring expected or useful results in terms of occupant behaviour or building performance as Foulds (2013) found in his recent research. However the ambition was for the technology within the school to contribute to an overall “learning curve” (Engineer P3:2010), within the school and within the industry. The PV array, designed as a future proofing measure to assist with forced ventilation when necessary, was “unfortunately axed” (Engineer P3:2010). The contractors drew on PV as an example of the complexity of weighing environmental impacts, and far from viewing PV as an awareness raising tool or an educational device, for them the array represented profligate use of public money. The contractors, unconvinced of the benefits, approached the client with the proposed saving.

we actually looked at the output, I'm making it up now because it was so long ago but the whole output could [...] only just power the plasma screen that it was going to, that was going to be used to display the information about how much power it was generating [...] and I don't know what's the phrase green-washing a project where you just add something on for the sake of it (Contractor/design P3:2011)

In the architects' and engineer's experience “the sake of it” was learning, future proofing, and pushing an environmental agenda. A further contentious strategy on P3 was the use of harvested rainwater for toilet flushing. The reduced rainwater harvesting system appeared as a “token effort” to the contractor who felt the system needed to be expanded and made more robust rather than reduced or limited in scale. A more stringent approach is required, as the contractor suggests, by not providing a mains connected system the school would become reliant on the efficacy of rainwater harvesting, a similar point raised by the engineer regarding the installation of PV. Implementing this as a requirement across all projects could

reduce costs and move the technology into the mainstream, as other measures used on P3, such as the permeable paving, and sustainable drainage, had done. Permeable paving having become “a matter of course and that was all done through you know, it was just as cheap as doing it any other way” (Contractor/site P3:2014).

This approach taken by the contractor underlies an environmental ambition that reaches beyond the capacity of the industry, and certainly beyond the client's ability to accept risk, yet does not align with the contractor's views on the efficacy and economics of installing the PV system. The example of sustainable drainage systems moving into the mainstream is valid, but this was augmented with policy, rather than bottom up change in procurement or specification. For the architect, addressing environmental responsibility through rainwater harvesting and the green roof remain more than just environmental tokens, the key is communicating it:

I still think quite a lot of sustainability or learning about sustainability from the professionals is about presenting, is about having enough knowledge to present the options and the full story rather than it being a snap decision by a client who [...] isn't as well informed perhaps (Architect/senior P3:2010).

5.3.2 Materials matter

Making an environmental approach mainstream requires not only addressing issues of assessment, ambition, and technology, but also fundamental issues of construction such as material use (Woolley 2013). On P3 the architects were committed to using what they described as traditional materials, as well as reducing a reliance on petrochemical based insulation materials (Harris and Borer 2005). Adopting a crafted approach, where traditional materials were used in a non-traditional way, presented challenges for the whole design team.

One of the key material strategies was the use of lime render and mortar. Fired at a lower temperature than conventional cement render this material represented carbon savings in construction, as well as opportunities for reuse in the future. With several practical difficulties to overcome, the contractor found it “a bit challenging”, in part due to the lack of forewarning and preparedness, but also because they had limited experience of working lime, which is more commonly associated with historic building renovation and conservation work. The architect, unwilling to compromise

on their specification commented:

I think it was a very good exercise to do because it actually [pause] we did learn lessons as it happened most of them negative I think on balance (Architect/senior P3:2010).

The specification of this material involved the contractors having to undertake a lot of research to support their argument against its use. They lost and eventually it was used. The contractor felt it had been specified to conform to what they saw as the architects' "big green agenda" rather than any longer term environmental strategy, the project architect had his "pet areas of interest" (Contractor/design P3:2011), and those remained unchanged throughout the project.

I think we argued or tried to change [specifications] quite rigorously at certain points at the beginning of the project, and when it becomes apparent that you're not necessarily going to win that argument you just, there's only so long you can keep arguing so you just like take it on the chin and move on (Contractor/design P3:2011)

The contractor remained sceptical about the need to consider reuse of materials post-demolition:

I mean there's talk about when we knock it down in the future and you can use the bricks [...] but then again in 100 years or 50 years who knows (Contractor/site P3:2011)

A counter argument used by the architect is that as we are so unsure of the future, future-proofing current buildings and designing in options for reuse starts to address uncertainty as "who knows what [...] will be in the future and how important it will be to recycle these things" (Architect/senior P2:2010). Reflecting on the project in 2014, the contractor noted that some of the materials specified for P3 were potentially "great" in terms of environmental performance, however they had not used lime render since, and did not know of any contractors that had. Added to which the contractors and architects worked on a further project together where the use of lime render had been specifically eliminated from the beginning, and so its use was no longer a debatable option. Whilst the individuals can see the benefits of certain materials and want to address the future environment, the industry prevent those actions moving forward. Whilst some materials with recycled content have moved in to mainstream use, in the contractors experience other projects have not been specifying "products which are out of the ordinary because they are good for the environment" (Contractor/site P3:2014). Fowles (2000:112) comments on this

dilemma, particularly how moving from understanding to action is not easy:

At the personal level, many people feel blocked and unable to take action to shape their lives in a more satisfying way. At the professional level many have quality ambitions which are frustrated by the narrow criteria applied in conventional projects (Fowles et al 1994 cited in Fowles 2000:112)

There is no suggestion here that the contractor lacks understanding, merely that pressures on action and behaviour vary, and are dependent on many factors, not least of all convention and reverting to the 'tried and tested', as discussed in previous chapters.

5.3.3 Beyond the building

There were additional environmental measures on P3 that were not directly associated with energy or carbon saving. These measures were concerned with the immediate environment within the school such as the sustainable drainage system. Beyond the building envelope, and the function of the school, the architects wanted to create a sense of enjoyment, a sense of space, introducing what the project architect referred to as “art enhancements” was part of this wider strategy:

things like that were unfortunately omitted because of cost reasons. So that's probably one regret, I managed to get the glass art to the resource bases and we got the glass art to the atrium but everything else was taken out, and that's a shame, it was minor money but [had] programme implications (Architect/project P2:2010)

Another important aspect to the school was maximising daylight, an energy saving strategy but also crucial in creating usable, enjoyable, healthy, spaces (Baker and Steemers 2002). The wider issues of climate change are important, however the ambition to create “nicer places to experience and be in” (Architect/senior P3:2010) drove the design, rather than a BREEAM assessment or a concern over future sea level rise. The acknowledgement that buildings are more than the sum of their parts is raised through the experiences of other projects, in particular P1. The relationship between the quality of space and our understanding and enjoyment of it, making it that “nicer place” is expressed as an equally important consideration by architects, the thermal performance and the feel of the building forming part of the architecture (Heschong 1979; Pallasmaa 2012).

This is not merely an architects' preoccupation or concern. Daylight was equally

important for the engineers, not least in reducing dependency on electric light, but as a process they were able to use to further their own research on daylight design. Using daylight modelling software, and pushing parameters, the engineers were able to advance their learning around modelling daylight performance and progress understanding of the role of daylight within a buildings' overall environmental strategy. The engineers were able to take this learning forward to other projects and disseminate to the wider profession, "I think we learned from [P3] that that's what we need to do, on the next ones [...] it's kind of a lesson learned" (Engineer P3:2010).

The concept behind the external spaces, particularly those that are exclusively for the younger years, are an extension of an overarching desire to create secure enjoyable space. The external areas provide opportunity to take learning outside through wildlife areas, ponds, and outdoor classrooms. This type of provision is more typically found in primary schools, however the school were keen to push ecological and environmental learning within the curriculum, and take it further than the architects had previously experienced:

in a way I think [P3] has managed to push that in terms of its curriculum, you know a reasonable amount further than other schools that we've dealt with (Architect/senior P3:2010)

Grass roofs formed part of that wider ecological learning, and were originally designed to enable students to use them as an extension of the classroom. The grass roofs also formed part of the wider sustainable drainage system, designed to assist with rainwater attenuation and enhance biodiversity (Architect/senior P3:2010). All these ambitions were modified during the construction process. The green roofs were reduced in scope and students were not able to use them. The art, which was to appear in central areas and weave through the building, was largely value engineered (industry terminology for omitted), and the proposed wind turbine was rejected at planning due to local opposition. The architect discusses the difficulty of budget restriction on what were perceived as environmental additions, and identifies responsibility:

it was probably the quantity surveyor, because naturally they're wanting to keep the bill down within budget, that's their remit, and the green items were inevitably listed as the value engineered items, so if there were any cost savings to be made they were nat-

urally the ones that were seen as luxury (Architect/project P3:2010).

This point refers back to the current problematic approach where “green” items are perceived as expensive or “nice to have”, but non-essential. As already discussed in P2, with increased use and specification, these items can become mainstream, thus thrusting what is conceived as the pluralist practice of green building out of a competing and contested area (Guy and Moore 2007).

5.4 Project 4 - Commercial

P4 represented a step change in commercial design, where both the building and process were non standard for a speculative commercial development. This commercial project included innovations in form, structure, material use, and servicing. A combined collaborative commitment resulted in a very commercially successful building. Professional relationships were galvanised, and continued beyond completion of the project. During the 2011 interviews the pride in P4 was tangible. In this respect P4 forms part of a longer story, where a group of people have continued to work together in trying to achieve more with each new building.

5.4.1 Aspirations

Speculative office buildings tend to be the lowest common denominator with developers sticking to a business as usual approach, an attitude of “we’ve got to let this space and so we’ll stick to what we know” (Engineer P4:2011). The occupiers of commercial buildings are usually removed from the impacts of energy consumption, with the developer having different aspirations to the people who are actually going to be working in the building (Langley and Hopkinson 2009). Lack of ambition to pursue energy efficient measures in commercial buildings leads them to often use far more energy than predicted (Bordass et al. 2004). P4, although commercially very successful, was an attempt at addressing some of these issues, not necessarily pioneering new techniques or technologies - most had already been championed - but occupying a place in the market that was ready for a “slightly quirkier building” (Client/agent P4:2011). As Fox (2009b) argues, a responsive cohesion in the built environment arguably includes an approach to environmental impacts.

if responsive cohesion is the foundation value, then designers need to build, let's call it 'responsive cohesion capacity' [...] into their designs to that what they design continues to exemplify this quality rather than ossify into a form of fixed cohesion or deteriorate into a form of dis cohesion in the future (Fox 2009b:19).

P4 represented an opportunity for the developer to fulfil a desire to create a different type of product and push the boundaries of commercial construction. Aware that P4 would probably only appeal to a broad minded organisation that would “value being in an environmentally friendly building” as:

the building had some quite strong characteristics aesthetically [...] in part as a result of [the] desire to create an environmentally friendly building which might have limited it's audience from a tenant point of view (Client/agent P4:2011)

The ambitions, developed early on in the project between the client and architect, set out the environmental performance required. As other professions joined the design team they were expected to buy into those ambitions. All those interviewed hoped P4 would be a significant step forward for commercial buildings, how they were thought about, and delivered (Architect P4:2011). The developer comments:

we are effectively the client, we're the ones that are deciding and discussing and sort of guiding the design team down that sort of route, and at that sort of time we also then said right OK if we're going to have a successful product here we need to establish some very clear criteria for the design team to achieve because it's quite different from what we would normally do (Client/developer P4:2011)

At the outset of the project a list of aspirations was formulated by the client and architect. This consisted of items that were specific to the project, and crucially, developed early in the process, the list included; a low energy strategy, sustainability, pre-finished materials, and prefabrication. The client also had a development matrix, focusing on aspirations for all projects which identified four key activities; investment and disposal, design, construction, and operation, with criteria for each, which they expected those they were working with to address. The opportunity to do something different and challenging with P4 came down to the location, which at the time was not commanding a premium rent. The location enabled the developer to take a risk and the design team to create a building that met efficiency ambitions in terms of cost and energy, exploiting the location enabled the developer to avoid financial burden:

I think that a lot of buildings suffer from, from aspirations that are just too beyond [the] reality of investment [...] we wanted to take certain things through and not to do too much actually, because that scares everybody (Engineer P4:2011)

The design team pushed themselves because they wanted to. This made the experience very different from the usual office building, and was an “iconic project in its way” (Engineer P4:2011).

I mean it wasn't a bed of roses I'll tell you, but I think the developer drove us still very hard [...] I think because we'd set those goals and they were different, if you have something different when you're designing a building it tends to focus people and bring them together (Engineer P4:2011)

5.4.2 Expectations

Although it was not ground-breaking P4 was daring, which made selling the concept to an otherwise cynical audience enjoyable for the commercial agent. Approaches such as reducing façade heating load and challenging the “glass aesthetic”, at the time made sense in terms of reducing energy, and are now principles embedded in building regulation. The approach to building fabric was unconventional, but so too were the processes of procurement, in particular the forward selling of what was an incomplete project. This forward selling was not contingent on the environmental aspirations of the project but rather it being viewed as a good risk, investors wanting to buy “exposure” rather than “aspiration” (Client/agent P4:2011).

The commercial market was felt to be ready for something different “I think it was at a point in time when consciousness per se was increasing quite significantly” (Client/agent P4:2011). The passive systems and the “earthy aesthetic” met the aspirations of an organisation that was relocating at the time, and whether the green credentials were the only driver for them taking on the building is “a fine judgement to make” (Client/agent P4:2011). Taking on the building did mean however that the tenant was able to “trumpet from the parapets” their own green credentials, the building they occupied fitting their corporate image and fulfilling a notion of corporate social responsibility (Lund-Thomsen 2007). It could have been a struggle to find tenants to take on what was essentially a very different type of building at the time (Client/developer P4:2011). A “green” building will not necessarily sell for more

but it will sell or let quicker partly because of the image it can bring to the occupier, as it feeds into a corporate profile that some sectors are very conscious of (Edwards and Naboni 2013). As well as lowering energy bills a building with a defined environmental ambition can also help with staff recruitment and retention in certain sectors (Langley and Hopkinson 2009). There is a recognition of an element of “luck” in finding occupants for P4, which at the time was not universally acclaimed as a building:

I know others who like it and lots of people liked it but it's, it's abnormal I'm not sure we're going to get many of those buildings built [...] I can't see that in my lifetime (Client/agent P4:2011).

The client goes on to add that negative perceptions of P4 were gone by 2014, and if it had been marketed eight years later then it would have been seen as “brilliantly cool”. As the initial resistance to P4, and the challenge to convention it represented, dissipated the project became a slightly exceptional and unexpected commercial success:

they did embrace it eventually but it was just a bit of an uphill struggle to get the old farts to take, to accept something new, but now it would be much more widely well received instantly whereas then it was a bit of a hill to climb (Client/agent P4:2014)

As discussed in section 3.4, the building played a significant role in educating the market and changing aesthetic expectations. Those observations by the client are crucial, particularly regarding the desire of the market to follow more pioneering projects, as this indicates the ability of a market driven approach to change perspectives and acceptance of more environmentally responsible building types. However it can equally move in the other direction, away from an environmental agenda, as the volatility of the market is reflected in behaviour.

5.4.3 Legacy

There is a strong sense of P4 contributing to a history, part of an evolutionary chain in terms of individual experience and in terms of shaping expectations of commercial buildings. P4 was more than a commercial success, it was innovative and represented a different commercial typology, there was a commitment because “there was something in it for everybody” (Client/developer P4:2011). For the client it was a new departure, for the engineers new techniques were used where they

were able to move the commercial office agenda forward, the architects were able to prove it was possible to build commercially, sensibly, and with flair; and the contractors used a lot of their in-house services making it commercially viable despite being on uncharted water. “Something” for everyone meant that there was a shared ambition, where minor inconsistencies, or even quite major ones, were resolved collaboratively. This resolution requires compromise, and a setting-aside of professional territories in favour of project outcomes.

Crucially there was absolute commitment from the developer to invest in design research and development, in particular in building one-to-one mock-ups of critical elements. Through this process the design evolved and improvements were made as everyone involved was able to witness the development of ideas and new techniques (Fowles 2000).

I think as well because it was quite different there was a spark about everybody and I think sometimes there isn't that spark about every project, not every project can have that innovation, or you know they can be a bit samey [...] I think for me some of the things about [P4] won't be repeated on many projects because of the fact that it was all quite different (Client/developer P4:2011)

The collaborative atmosphere was dependent on dedicated and passionate individuals who carried a shared responsibility across the project. Everyone brought their expertise to bear on new problems, everyone was committed to making it a success through visiting manufacturers, visiting factories, and putting in additional time and investment. There were opportunities to do research, contributing to building a different mindset, where the team were able to “all learn from one another” (Architect P4:2011). Moore (2010) suggests, problem solving groups share three qualities: heterogeneity, informality, and trust. Cohesive groups learn more and appear to be more successful (Yorks and Marsick 2000), cohesion in this sense referring to the pulling together and lack of blame culture on P4. Heterogeneity becomes crucial where individuals are able to bring their unique approach to problem solving. How the complex integration of the physical elements influenced the design team, is a significant legacy of this project:

[...] what that does is it brings the team much closer together so your relationships a lot of the time, are a lot stronger, because you're trying to integrate everything you can't, no one can work on their own they've got to always collaborate on a particular thing and actually I've not had a project where I've kept, maintained relationships with those people as much as this one (Engineer P4:2011).

The size and significance of P4 created pressures too. For the architect the project was eight times bigger than anything he had previously had responsibility for. It was also an important client for the office, and a new building type in a new sector - the learning curve was very steep. The architect admits to being too busy to reflect at the time of the project, however delivering talks post completion with other design team members provided a valuable opportunity to reflect. For the architect these talks, delivered around the country by three of four of the design team, were yet another demonstration of the way the team had pulled together and were an interesting and reflective way to hear what the other members of the team thought and felt about the project, which was far from the usual “knocking up a steel frame and covering it with plasterboard” (Architect P4:2011).

P4 achieved a functional simplicity that has been called for in building design for a number of years (Pelly and Hartman 2013). It drove the developer to produce an environmental policy which addressed the sustainability demands of tenants and which eventually formed a matrix of criteria across four aspects of their work covering: investment and disposal, design, construction, and operation. Thus creating a knowledge database around building performance, that enabled the company to benchmark their buildings with the aim of bringing that benchmark figure down in terms of energy consumption and carbon emissions. However in 2011, it remained a disappointment to the developer that they had not since completed anything as innovative as P4. Whilst they remained insistent on BREEAM excellent, they achieved it in different, less innovative ways. For the developer this felt like a retrogressive step, reverting to less progressive technologies was “like going back over 30 years” (Client/developer P4:2011).

5.5 Summary

Our experience of place integrates with our identity, perhaps no more so than when physically, emotionally, and intellectually engaged with creating that place, and contextualising it within a wider environmental concern (Carrus et al. 2014). This chapter has focused on the experiences around the creation of four particular buildings, in different places, with different programmes, and varying environmental ambitions. Each project has contributed to change within the industry, within the person, and the profession. The full extent of the influence of these projects cannot be known within this research, or within any other. These are the unknown impacts, or the never to be known impacts of a building, but what can be established are the identifiable experiences that led to change, and the change that has taken place as part of a reflective process.

As one contractor notes, every construction project has an element of learning, and this curve is steeper on some projects than others. The four projects discussed here exerted learning in particular directions, which in turn relate to individual experiences. Not all of those experiences positive in terms of outcomes but still discussed and reflected on, which is significant. However, learning from mistakes or good practice cannot readily be replicated as it is unlikely that any two buildings will be the same, therefore good practice, learning and innovation can only be interpreted in proceeding projects. The importance of learning by physical engagement in process appears to be key, and is not necessarily dependent on haptic engagement, but can also be a bearing witness to. Using the process of construction to augment learning and research was common among the projects, and successful in varying degrees, as the knowledge lies in the multi aspects of the process, theory, and interpretation of the building (Till 2007:2).

Here the emphasis is on experience and exposure to process, where the production of physical space engenders a transformation through learning. Lange (2000) describes learning as restorative rather than transformative, restorative learning enables the learner to return to a norm, in the case of her study identifying ethical conflicts and transforming relationships to work. That can be seen through the projects in this chapter, how the relationship between experiential learning and reflection can be restorative in terms of relationships with practice and the wider

industry. The material specification on P2 for example, where contractors were engaged in learning and research, but where the outcomes of that learning were not transformational, but rather reinforcing norms. There is a difficult balance to strike in this context, whilst there is an acknowledged need to push the industry towards environmental responsibility this can not be at the expense of individual learning or at the risk of engendering dissonance.

Each project had an impact on the wider environmental discussion, whether that was through trying to push client ambition in a more environmentally appropriate direction or using the project as a tool for learning and research. The importance of these experiences, as examined through the project, is the influence beyond form, the feeling of the building, the space, light, and social spaces they create, what Seamon (1977:125) describes as “at-easeness” in place, generating a feeling of comfort, both psychologically and physically. The emphasis is on creating places for living, learning and working that go beyond the notion of building as product (Pultar 2000) where the ambitions of the design team are carried forward through construction to occupation.

The four projects examined as part of this research all had a commitment to improving environmental performance beyond the demands of legislation or policy. P1 and P4 having particularly resonant impacts through the industry, whilst P3 and P2 were impactful through ongoing future projects and collaborations. Whether through material use, energy consumption or social impact. The projects fulfilled a wider environmental remit in response to future demands. An ambitious brief and strong commitment were key to the realisation of the projects, where a clear brief from the client enabled the design team to take a holistic approach.

The following chapter examines the emergent themes that arise from the analysis contained within chapters 3, 4 and 5.

Chapter 6: Nine themes

The ultimate aim of phenomenological research [...] is to use these descriptions as a groundstone from which to discover underlying commonalities that mark the essential core of the phenomenon (Seamon 2000:3).

6.0 Introduction

As Seamon's quote above suggests, a phenomenological approach to research aims to discover commonalities, through exploring what is often described as the taken for granted in the lifeworld experiences of participants. This research has been informed by that approach, and in the preceding chapters the taken for granted has been examined through descriptions of those experiences. This chapter turns towards the generated knowledge and identifies those underlying commonalities as they emerge as themes within the research. Through the analysis of the interview transcripts nine key themes emerged which represent the interwoven axiological tendencies threading through the research. The nine themes are grouped under three headings; commitment, collaboration, and compliance, categories that capture the distilled essence of the themes they contain (see figure 26 below).

COMMITMENT	COLLABORATION	COMPLIANCE
the deep end	sharing ambitions	pushing boundaries
just who I am	feeling and being separate	ticking boxes
doing the right thing	valuing reflection	anticipating change

Figure 26. The nine emergent themes in three categories

Although described in discrete sections, the emergent theses are interlinked and the boundaries much less clearly defined. It is the lived experience that is important in transformation, with the themes emergent from those experiences. Themes are

interlinked and much less clearly defined than the model might suggest. Whilst an organisational framework is useful to set out emergent themes, the limina between one theme and another is much more fuzzy. It is the experience that is lived, rather than the theme.

As with the previous two chapters, extracts from the interview transcripts are drawn on. These extracts are referenced by the profession of the participant, the project, and the date of the interview. The scoping projects form part of this chapter as they were analysed along with the main project interviews, and as such make a contribution to the research as a whole. Quotes from the transcripts can be cross referenced with the research participant list in appendix A and the interview headlines in appendix C. A summary of the emergent themes as they map against each analytical lens can be found in appendix D.

6.1 Emergence of the themes

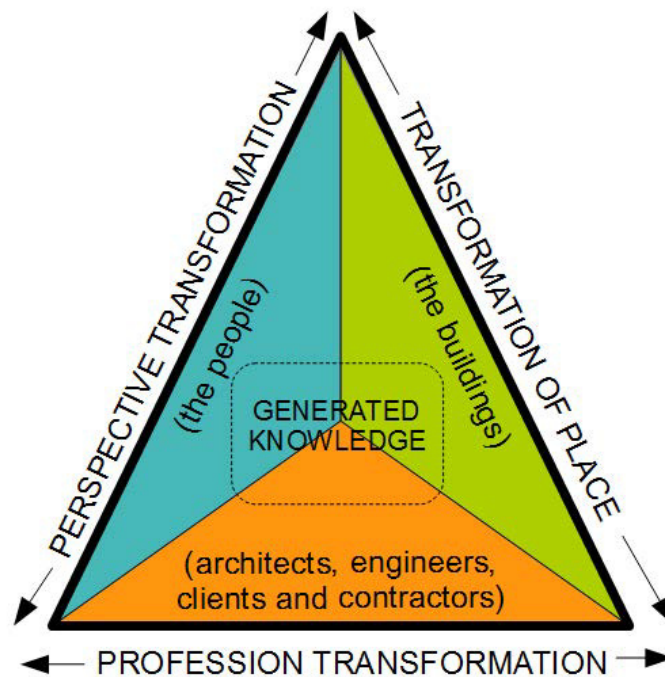


Figure 27. A focus on the generated knowledge through the three lenses

The themes emerged through the interpretive analysis of the interview transcripts, referred to as the generated knowledge. The analysis was informed by a

phenomenological approach, adopting a process of examining the transcripts line by line, identifying general and then relevant meaning. It is from the relevant meaning that the themes emerge (Hycner 1985). These themes have then been gathered into three main categories where commonalities are shared. This process is discussed in detail in section 2.4, and specifically illustrated with extracts from the analysis in section 2.4.2. Figure 27 above illustrates the concept behind this approach where the generated knowledge is examined through each analytical lens; people, professions, and project. These three analytical perspectives are then employed again to examine each emergent theme. This re-examination is described in figure 28 below, where the theme *doing the right thing* emerges from the analysis of the transcripts, how this relates to the experiences from within each perspective is then captured through further description. From the building perspective *doing the right thing* can be interpreted as performing according to design or demonstrating a responsive cohesion (Fox 2009b), as discussed in chapter 5. In terms of the collected professional experiences *doing the right thing* implies adherence to a professional code of conduct (explored in chapter 4). A personal approach to *doing the right thing* may be a response to a perceived duty to wider society, discussed in chapter 3.

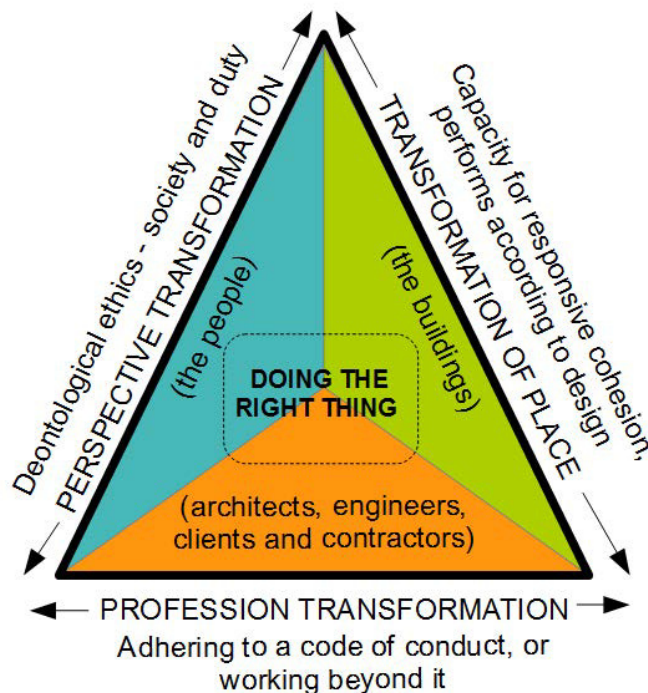


Figure 28. Examining an emergent theme through the 3 lenses

Each theme has been examined in this way, a complete mapping can be found in

appendix D, the relevant extract of the complete map can be found in each of the following sections, which provide a detailed explanation of each of the emergent themes.

6.2 Commitment

This section collects together the themes that link participant experiences to a sense of commitment by exploring the origins of ethically motivated actions through the themes of *the deep end*, *just who I am*, and *doing the right thing*. These emergent themes are summarised as they appear through the three analytical lenses in figure 29 below.

	COMMITMENT		
	THE DEEP END	JUST WHO I AM	DOING THE RIGHT THING
PERSON (the people):	personal experience and those of others count	personally held values and attitudes impact environmental behaviours	deontological ethics – society and duty
PROFESSION (architects, engineers, clients, contractors):	learning through doing – formal and non-formal routes	professional body regulation and alignment with personal values	adhering to a code of conduct and working beyond it
PROJECT (the buildings):	invites questioning and challenges learning	project as learning rather than profit – challenges planning and preconceptions	capacity for responsive cohesion, performs according to design

Figure 29. Commitment: emergent themes mapped against each analytical lens

6.2.1 the deep end

The deep end refers to the analogy of being thrown into the deep end of a swimming pool, you either sink to the bottom of the pool or you very quickly learn to

swim. You have to learn rapidly when confronted with a new and potentially overwhelming task. The experience of being thrown into a new situation, being given more responsibility than you have had before, or confronting new working processes, are examples of deep end learning emergent from the interviews. Whilst these experiences led to a change in practice, or a growth in confidence, they could be accompanied by a sense of panic and a realisation of the gravity and responsibility associated with a professional role. Giorgi (1999:82) describes this learning as being complex and confusing, identifying the existence of an “existential learning” where developing confidence in your capability unlocks learning potential. The connections between learning, experience, and confidence are evident in the reflections of the participants, although they vary in impact. As this architect recalled, when the detail at a roof edge failed and the roof leaked on their first job as project architect:

suddenly then I thought this isn't, this isn't fun, this isn't something which you put a picture on the wall and you take it down after six months when you're bored with it, it's there for good [...] these buildings that you're creating, you're putting people in to work or to live (Architect Sp3:2010)

This architect went on to become a director of a practice, the experience developed their professional perspective, as well as a deeply felt personal commitment. The architect goes on to say:

it was the first project where I felt the weight of responsibility that if I got it wrong it would be my fault (Architect Sp3:2010)

Deep end experiences were also recalled as being rewarding, when participants were immersed in problem solving. Experiencing a steep learning curve became a recognisable shift in the level of responsibility and knowledge, changing practice, and raising consciousness. The client from P4 refers to this in the interviews in 2010 and 2014, and for the architect on P4 the responsibility was greater than on any previous project.

It is possible to draw a connection between deep end experiences and the processes of deep learning, outlined in chapter 1 (Biggs 2003). Research suggests that deep learning resonates with the individual and stays with them longer as it changes perspective. Deep end experiences align with Mezirow's (1991:168-169) ten theoretical stages of transformation. In particular stage one - the disorienting

dilemma, and stage nine – developing self-confidence. Being thrown into a new or unknown work situation carries with it increased challenges, as Illeris comments:

If our work is a dull routine, or if we are stressed or feel that we are being controlled, this will have limiting impact on the possibilities for learning. Conversely, if our work is challenging, driven by interest and meaningful to us, we learn both more and better (Illeris 2011:20).

Illeris (2011) argues that if there is lack of interest the learning will only “appear” and will be more likely to fade, which has parallels with the concept of surface learning, the alternate partner of deep learning (Marton and Säljö 1976 cited in Biggs 2003:12). whilst challenging and interesting work can propagate deep learning, a positive outcome can be countered by stress or a feeling of lack of control. In some interviews these experiences were remembered as difficult to endure or cope with at the time but when reflected upon a deeper value became evident. As the earlier extracts from the interview with the architect suggest, the process of discovering the leaking roof, accepting responsibility for it and trying to correct it were difficult at the time but led to a formed identity as an architect and a deeper commitment to the responsibility of the role. Far from feeling a lack of control, the the external factors of a leaking roof worked with internal emotions and values to transform thinking and heighten a sense of having to get it right the first time. The architect goes on to explain that buildings are not prototypes, they are the first and final experiment, hence the pressure to get it right first time is much greater (Spector 2001). The architect adds:

[people] use the car as an analogy all the time, which I hate because buildings are not like cars [...] they spend millions and millions and millions and then they perfect the manufacture of it and then they roll it out, buildings - you're experimenting with your final go and I think that's the most difficult thing that you're, you don't have that luxury of going right for mark two we're going to change this (Architect Sp3:2010)

The deep end also resonates with experiential learning theory as developed by Kolb (1993) and reflects the nature of the construction industry where new and complicated problems frequently present themselves, requiring knowledge and experience to be applied to new situations in order to solve the problems. Figure 30 takes the concept of experiential learning and draws a distinction between active and passive transformation in terms of either active involvement with, or bearing

witness to, an event which could be described as a disorienting dilemma (Mezirow 2000b).

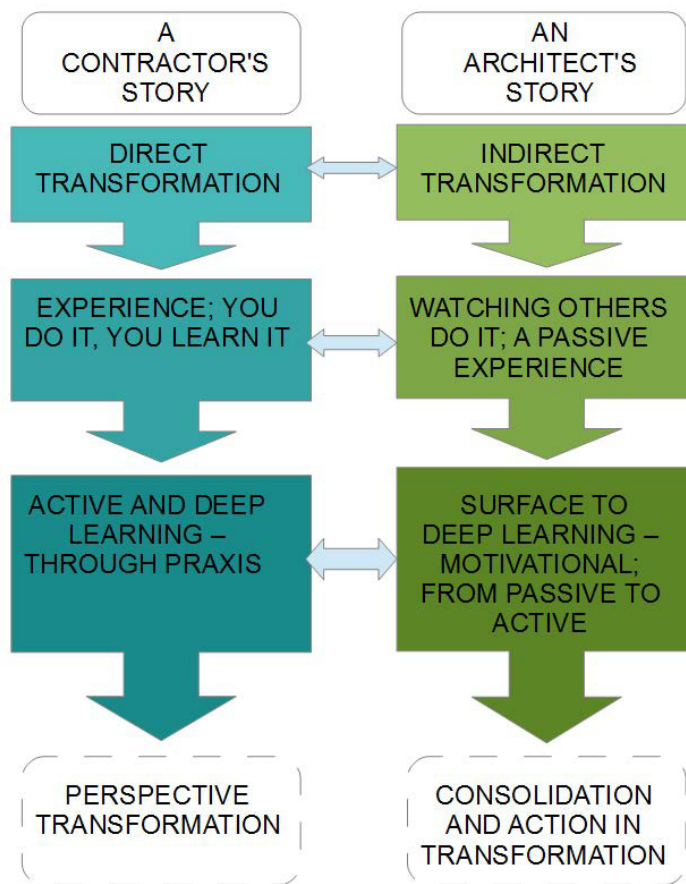


Figure 30. Direct and indirect experiences leading to transformation

The contractor was involved in the air tightness testing of P1, discussed in section 5.1.3. This was the first time the contractor had been exposed to the process. The experience transformed their perspective regarding the process and the importance of air tightness in terms of building performance to such an extent that the contractor went on to invest in equipment in order to conduct similar tests themselves on other buildings, becoming an advocate of air tight construction techniques. The transformation of perspective happened as a result of experiencing the test rather than being exposed to statistical research, although doing the maths was considered import by architects in terms of evidence to support decision making.

The architect's story was more detached but transformative nonetheless. As a child, the architect attended a school built in the 1960s with a flat roof. By the time our architect was a pupil there, many years later, the roof had developed a leak. Reflecting on the experience of being exposed to buckets and watching the leaks in the classroom, the architect recalled: "I remember thinking why don't they just put a pitched roof on it" (Architect/project Sp1:2010). That quizzical child became an architect whose values reflect an embedded ethical approach that buildings are for people, stating "I thought that that was how design should happen you know, for people" (Architect/project Sp1:2010).

Both examples within the model represent concrete experiences as related through the interviews; an observed transformation by the architect of the contractor from P1, and a transformation through witnessing an event for the architect from Sp1. Both experiences led to a further testing of the learning, moving learning beyond a reaction to a situation. Eraut (2000) describes this in his typologies as implicit learning and reactive on-the-spot learning. These experiences can equally be explored through what Kolb (1993) describes as performance, to form part of a continuum in lifelong adaptations. The expansive nature of knowing manifests in a consciously changed future direction for the participants. In this way change occurred that led to what Kegan (2009) terms as a subject to object transformation where:

knowing moves from a place where we are "had by it" (captive of it) to a place where we "have it", and can be in relationship to it, the form of our knowing has become more complex, more expansive (Kegan 2009:45).

Extending Freire's ([1974] 2008) object to subject transformation, where we become aware of our actions on the world, Kegan (2009) describes this in his complex epistemologies (figure 11 chapter 1) as the self-authoring mind. Moving from subject to object and the concluding stage - the self-transforming mind (see section 1.3) – is never reached prior to mid-life. The age difference in the participants in this example, may be significant in this respect. The architect as a child would have been at a much earlier developmental stage, perhaps even prior to the social-mind, whereas the contractor, as an adult in mid-life, may well have been moving into, or have moved into, a self-transforming positionality (Kegan 2009:47).

Having a deep end experience was identified by all of the architects who took part in the research. This may point towards the nature of the profession where architects are exposed to various issues. Bauman (2008:07) sets out a list of dilemmas that “haunt contemporary architectural practice” and pull the architect in different directions, reflecting as Till (2009) suggests, the messy nature of architecture. Although identified by all architects, it was not an experience exclusive to architects. One client identified P4 as “the steepest point in my learning curve for sure, yeah, and consciousness generally” (Client/agent P4:2011).

Being thrown into the deep end was instigated by architects as well as experienced by them. The architect on Sp2, with over thirty years experience, has witnessed both the changes and the lack of change in the industry. Commenting in particular that when contractors are encouraged to work in new ways and with new materials, their confidence grows as “once they've done it and they've found it works, it's good, you know they will do it again” (Architect Sp2:2010). Suggesting that a *deep end* experience, and being encouraged into new ways of working, can transform future practice through a deep and lasting change. Eraut (2000:124) argues that knowledge moves from procedural to tacit as a consequence of repetition, the above reflection on contractors attitudes to new ways of working captures both a commitment to tried and tested ways, discussed in section 4.3, but also how new procedural knowledge can move to tacit once experience and confidence are in place.

6.2.2 just who I am

Learning, breathing, and experiencing are all part of our biography and biology (Fenwick 2010; Jarvis 2010). The emergent theme entitled *just who I am* is therefore applicable to many situations we encounter lifewide. The exploration of this theme makes explicit reference to the origins of the participants' environmental values and actions, which as other research has found are complex and based in emotion (Kovan and Dirkx 2003; Maio et al. 2001; Pooley and O'Connor 2000).

During the interviews participants were invited to consider how their motivations for environmental actions were influenced, the answer to this was often that it was just part of who they were, that they had always felt environmental issues were

important to them. Maio et al. (2001:105) highlight that “people may consider particular values to be important because they attach strong, positive feelings to the values and not because they associate cogent arguments with the values”. The extract below suggests that both aspects are contained in this engineers understanding of a value led aspect of their personality, as well as being aligned with the cogent issues facing the world:

it's just an inherent characteristic that I've got I think, it just so happens that it aligns with what [...] the world is facing at the moment (Engineer/services P2:2010)

The notion of a clear environmental positioning *just* being part of who they were was a strong thread through the conversation, not identifying actions as being triggered by any one event stood in contrast to the outcomes of the pilot study where all participants identified an experience that changed their perspective, as discussed in chapter 2 (Pooley 2010), where a defined moment of transformation was identified by the participants.

Acting on intuition is valuable, and having value led action, what Freire ([1970] 1996) refers to as praxis, is significant in transformation and the way in which we shape the world through our actions (Schapiro 2009:103). There is a danger that the professions become overly reliant on lone environmental champions, acting on their values, and that those individuals may become sidelined, appear as outsiders, or environmental pariahs. The construction industry was identified by the client from P2 as still being reliant on such individuals who:

through experience pick up the agenda naturally and then [...] fight for that agenda in the face of pressures coming from other areas from people that really don't know what you're talking about (Client P2:2010)

Even when an individual is supported within a team, by a practice, or by their employer, individual action is still required, relying on individuals to challenging routine and push an agenda, as one engineer explained:

I think this firm allows individuals to [...] be a bit more challenging and creative [...] a lot of it does come down to the person, the person who's working on the project (Engineer P4:2011)

Learning shapes who we are, and critical reflection becomes less necessary as we move forward with a new knowledge and a changed biography (Jarvis 2010). Hostetler (2011:85) makes the argument that good people can trust their values, he

cites Dewey (cited in Hostetler 2011:85) when qualifying that trusting of values must be limited to situations that have been experienced before or are familiar, suggesting that we navigate new situations by acting on intuition, and feel our way if previous experience is absent or the situation is unfamiliar. Hostetler (2011:85) uses the example of emergency workers, who rely on who they are, and the experiences that form their biography, to make necessary professional judgements. A parallel can be drawn with the construction industry, where critical, and time limited decisions need to be made often under pressure. Values can be developed through experience, reflection, and cognition, what Eraut (2000) describes as intuitive cognition. Eraut highlights two further cognitions, analytic and deliberative. These can be drawn out in the extract below, where the architect focuses on thinking about thinking, rather than thinking about feeling.

I think the idea that you could actually get energy for free has always appealed to me and why not use what's there rather than waste resources, that's always been in the back of my mind [...] I don't think sustainability was a word [laughing] in those days (Architect Sp2:2010)

Early life experiences are acknowledged by the participants as significant in forming their professional actions with regard to adopting an environmentally responsible approach to design:

that comes from my background [...] lefty socialist middle-class, where you have quite a strong sense of society and needing to serve it [...] its not in my nature to design buildings that aren't social in that sense (Architect/senior P3:2010)

In the extract above the architect refers to buildings being social, and during the interview the concepts of social and environmental responsibility are explored, making links with the wider definition of social and environmental sustainability. Another architect reflects on childhood experiences as shaping their personality:

I'm just that sort of person [...] even when I was a child I'd hear about climate change and I'd be concerned about it, or you know, there was also the nuclear arms race at the time (Architect P1: 2010)

This unfolding of personality and awareness of values recalls aspects of child developmental research, in particular attachment theory (Ainsworth and Bowlby 1991; Ainsworth 1979). Where a sense of attachment brings security, self-awareness and confidence, enabling the person (or child) to take more risks and

hence expose themselves to more learning opportunities. Early developmental processes are critical in cognitive development as Piaget (1971) suggests, and in developmental process of learning (Krathwohl et al. 1964).

The theme, *just who I am*, is based in both cognitive and affective realms in terms of developing and acting on values. A theme that captures both mind and soul, including an acceptance of acting on intuition, developed through experience and formed in personality. Cranton (1996) explores the role of personality types and learning within her research by drawing on Jung's theory of individuation, an unfolding awareness of who you are, and explores whether certain personality types are more open to transformative learning. Personality traits and types are complex and we display different traits in different circumstances, so although the research was inconclusive, it provided some commentary on propensity, and the ability to act on values despite external pressures. Kolb (1993) emphasises this connection to psychological types through the theory of experiential learning, stating that learning does not rest in any one realm, cognition or perception but that:

It involves the integrated functioning of the total organism – thinking, feeling, perceiving and behaving (Kolb 1993:148)

The discussion within this research is focused on reflection, rather than categorisation of personality, and Kolb's expansive definition can be applied to the reflected experiences discussed here. Developing and holding values, as the engineer from P2 commented earlier, is potentially less dissonant when your values align with what the world is facing, or when you are in a position professionally to determine direction in accordance with your values, as discussed through chapters 3 and 4, where agency within professional decision making, particularly the ability to select projects, was valued.

6.2.3 doing the right thing

In many ways this underpins the previous two themes as it embraces ethical motivations, particularly deontology and consequentialism, and features as number two on Bordass and Leaman's (2012) list of actions for a new professionalism. As Mason (2009) argues an ethical approach:

is often described as “doing the right thing” and in the construction context ethical behaviour is measured by the degree of trustworthiness and integrity with which companies and individuals conduct business.(Mason 2009:2)

As Pultar (2000:155) argues, ethics form the basic precepts through which professionals act in designing and constructing, however this is not always evident in built form. This is something that has been discussed through Fox's (2009b) theory of responsive cohesion. The ethical aspects we employ when we build are crucial, and as Fox (2009b) argues need to be expanded beyond an anthropocentric approach to include a nonanthropocentric ethical approach. Fox takes the argument beyond people, and beyond human space to encompass all space and all environments. The *right thing* is open to question and within the interviews is not confined to environmentally responsible behaviours but expands through the participants comments to include social responsibility and integrity.

During the course of the interviews it emerged that participants had been involved in action that was discordant with their values; throwing valuable materials into a skip, installing insulation made of harmful chemicals, demolishing a building that could have been renovated, installing energy hungry electrical heating - the issues varied among the participants. What could be described as a praxis dissonance emerges within this theme, where the notion of a cognitive, physical, and emotional conflict (Dirkx 2008) combines with Freire's ([1970] 1996:33) definition of praxis. A praxis dissonance, rooted more in individual action and reflection than cognitive dissonance, is a somatic dissonance related to action as well as thought, beyond an emotional dissonance. Praxis dissonance exists within interviews where participants have had to undertake tasks through professional obligation that conflict with their values. This brings forward issues from the previous theme as an undermining of who they are as an ethical being. The concept suggests that whilst *doing* is important in the cycle of reflection and action, when this action is discordant with values it becomes a dissonance, doing something you do not want to, or feel as though you should not be doing.

Other examples of this type of dissonance occurred where participants, either due to budget restrictions or a restrictive brief, were unable to install a product they knew was more environmentally appropriate, but they installed it anyway; either at their

own expense or finding ways to save money on other items. This 'sustainability by stealth' was raised by more than one of the participants and across three of the professions; engineers, architects and clients. Where subverting the brief, budget, process, or specification, had occurred in order to roll in more energy efficient measures or an item they knew would improve the performance of the building, but one that had not been allowed for in the budget. One contractor reflects Fox's concern with an anthropocentric approach to the built environment when he questions how people experience buildings:

I think sometimes that [pause] perhaps we don't think enough about the, the people who are in that environment, you know the people (Contractor/site P3:2014)

The same contractor also comments on the importance of individual motivation as critical for the industry to change, suggesting there are right and wrong reasons for taking environmental action.

University was cited as a starting point in consolidating feelings that taking an environmentally responsible approach to design was the right thing to do, as it enabled participants to place feelings within a cognitive framework, and share those thoughts with like minded people. In this sense restoring prior held thoughts and feelings, rather than transforming perspectives. Several of the architects cited university as a major influence on their values and their thinking, where consolidation of thoughts and feelings often took place. Reflecting on those experiences is what Lange (2004) refers to as restoration rather than transformation and draws this distinction when she discusses her research into citizen action and sustainability:

The participants made it clear that their ethics [...] did not require transformation but restoration to a rightful place in their lives and in society at large. Contrary to various social analyses, these ethics were not missing among these participants but had been sub-merged (Lange 2004:130).

There is a perception that there are personally held right reasons, which links the issues examined in this theme with the previous two. During the 2014 interview a reference is made to a responsibility towards the next generation, and how we have known for some time the impact of our actions in terms of environmental degradation and climate change, and that this knowledge alone should provide the

incentive for action – *the right* reason. The contractor on P1 discussed the motivation for working on a difficult, yet unique, project. Emphasising that it was a moral obligation as well as an environmental one to address issues of energy efficiency and resource waste in the industry, expressing a feeling of being compelled or duty bound to others. This is discussed by Daloz (2000), where a feeling of *doing the right thing* is developed through reflections and interactions with others and the world, and is not confined to an internal dialogue or value developed without reference to the outside.

When good environmental performance is demanded by building users this can force development in a particular direction. However relying on building occupants, users, or tenants, to change the direction of the industry alone does not represent a dependable strategy, as motivations can be fickle and fluctuate depending on economic and cultural aspirations. As one client reflects:

I think probably some tenants have moved more towards wanting to, to do the right thing and some tenants have become more relaxed about it as, as times have been tough [...] funnily enough against what I expected there's probably been a softening, whether that, whether that'll change again who knows (Client/agent P4:2014)

The softening referred to above is the prediction the client made in 2010 that there would be an increased demand for *the right thing* in terms of environmental performance of buildings and that this had not transpired. By 2014 there had been a softening in the demands of tenants in the face of other pressures, particularly economic pressures.

For the architect on P1 designing strategies to reduce energy consumption and CO₂ emissions fulfilled an obligation to the client and to the community. Encompassing a wider ethical responsibility whilst producing an example of good practice for the rest of the industry, what Till (2009) describes as short term expediency versus long term responsibility. As discussed in section 3.1.1, this architect was driven by a sense of guilt when not working on projects that aligned with his values, “then I worked on one or two buildings where you [...] felt a bit guilty about what you were doing” (Architect P1:2010). Guilt and duty combine to change professional direction and perspective, the guilt representing what Mezirow (1991) described as a disorienting dilemma, which as Dirkx explains “are dramatic, profound, and deeply moving”

offering “us an opportunity to reflect on and reexamine aspects of our lives (Dirkx et al. 2006:132).

A less experienced architect on P3 explained a dissonance within the process of building, how putting energy into a building just for it get knocked down felt like a contradiction with their values, and that “it just seems the natural thing to do, to make it [the building] flexible and future proof it” (Architect/project P3:2010), again reflecting a desire to do *the right thing* in a professional context but also aligning with personal values. There is a lot of custom and tradition within the the construction industry where tried and tested methods are deferred to, which can work in conflict with how things could be done. Later in this interview the architect questions their self-image, that whilst they were “green generally” there was scope to “always do better”. Suggesting they feel they are *doing the right thing* by being “green”, but that this also involves striving towards being better, that the right thing is not always achieved. This cycle of opportunity, to reflect on actions, and what constitutes the *right thing* relates to what Wenger (2011) describes as value creation when he writes:

Usually those who can tell the story are [...] the ones who have both done the learning and taken it into practice. In other words they are both the carriers and the witnesses of the process of value creation across cycles. But they may not have thought through that process and need some framing to articulate the connections among the cycles of value creation (Wenger et al. 2011:34)

The *right thing* is not perceived as a single issue focusing on environmental action, it is not just about energy, carbon, or resource use, and as one client describes, it is there for you to call on, as part of your learning and knowing:

your learning [is] sort of sitting in your memory it's there to call upon when you're debating what you should and shouldn't do with any one particular element of design, that comes through doesn't it, without it being actually so obvious (Client P2:2010)

By creating space to reflect on our duty to society (Allen et al. 2015), the wider community, and the wider non-human world, we can perhaps start to position what for us is *the right thing*. The building has to work for the client as well as wider society. Making the building work necessitates working with others, as discussed in chapter 4, and in the following section.

6.3 Collaboration

The following emergent themes refer to the complexity of the process of construction, and relate to both the affective and cognitive collaborations required to reach cooperation and agreement in transforming practice, and hence transforming place. As Day and Parnell (2002) explore through processes of consensus design, collaboration captures where compromises are made through a collaborative processes. The experiences contained in the interviews, and where this was enabling or limiting, are explored as potentially creating or diminishing opportunity for learning:

definitely we've had to compromise [long pause] but I think we're compromising less and less now (Architect Sp2:2010)

Collaboration was the word used to describe the successful working of design teams. Collaboration is explored through three themes; *sharing ambitions*, *feeling and being separate*, and *valuing reflection*, which are outlined in figure 31.

	COLLABORATION		
	SHARING AMBITIONS	FEELING AND BEING SEPARATE	VALUING REFLECTION
PERSON (the people):	working with like-minded people	not fitting in with the perceived norm	opportunity to reflect on work
PROFESSION (architects, engineers, clients, contractors):	cross and interdisciplinary boundaries challenged – a no blame culture	frustration with professional practice and teaching	embedding reflective practice in the everyday
PROJECT (the buildings):	project embodies physical evidence of aims	aesthetics and sense of place	importance of post occupancy evaluation

Figure 31. Collaboration: emergent themes mapped against each analytical lens

6.3.1 sharing ambitions

The interviews revealed a strong sense of team, and the need for clear communication among teams and between professional territories, a shared ambition that also contained, tolerance, and a lack of hostility and blame culture, helped build this communication. As the contractor on P3 recalled:

they were all very good, all the people involved were great guys and it was good you know, there was no falling out you know and that's what you want and that's how jobs go well because everybody gets on (Contractor/site P3:2011)

Closer discussion of the project revealed very few negatives, even though there were times of tension over certain items these were confined to professional tensions. This is not always the case on a project as the same contractor comments in 2014:

the nature of a successful job really is all about how the team gets on [...] if all of those guys get on you very rarely have a bad job, if you have a weak link in any of those areas or where people [...] rub each other up the wrong way it becomes, it doesn't work (Contractor/site P3:2014)

The contractor goes on to say that tension within the team creates suspicion, with too much time spent dealing with inconsequential issues, “so you know collaboration is all [...] that will make or break a job” (Contractor/site P3:2014).

On all four projects relationships among team members were crucial. These were either ongoing relationships that had been formed on previous projects, or new relationships being formed. The forming of new working relationships, or continuing existing ones, was a distinct thread through the experiences of the project teams, although collaborative working was sometimes difficult to maintain due to competition and tendering processes on different projects. The importance of forming relationships picks up on Lave and Wenger's (1991) early work on communities of practice and makes reference again to the importance of attachment (Ainsworth and Bowlby 1991), in this case attachment to a team, a desire to retain that attachment and to develop it:

the particular group [...] that we worked with, we had a relationship with prior to, and we've still got a very strong relationship with now (Architect P4:2011)

The unique aspects of P4 and strong team cohesion helped to embed a sense of pride in the project, and resulted in extremely successful dissemination. Learning did not end with completion and continued to influence those who worked on the project as well as the wider industry. A blameless culture fostered cooperation and learning (Wenger et al. 2011), and a sense of a shared ambition as team members took responsibility for resolving new and technically challenging issues, even if those issues fell outside of their professional discipline. An illustration of this is provided by the client, when he describes how, whilst a sub-contractor was on holiday, a problem occurred that was resolved collaboratively by other members of the design team, before the sub-contractor returned from holiday, as the client recalls:

the amount of effort he [the sub contractor] put in early days [...] was just repaid by everybody else just putting in some effort to help him. And by that point you kind of think actually this is a really good team and everybody wants to solve the problems (Client P4:2011)

With the shifting landscape in the construction industry, and a significant change in both current and traditional roles, engendering cooperation in the industry is vital for future practice (Pooley 2015).

Working with a sense of shared ambition becomes more of a reality for those who already value environmental responsibility, as awareness shifts and the profession transforms towards addressing environmental issues with increased commitment. Specifically for one architect, there was no longer a need to stand over contractors in 2014, as there had been in 2010. There is recognition here of a change in the industry in the intervening years, a change in ambition and action, representing a reversal of prior roles as learning flows both ways, and a note of surprise at the advanced knowledge of some contractors:

there are a number [of smaller contractors] we've worked with now who really are teaching themselves stuff [...] they're actually quite keen to join in and they want to be involved and want to try things and want to learn about things [...] there are even a couple who [are] possibly teaching us stuff (Architect P1:2014)

This theme moves beyond everyone on a project merely wanting the same outcome, as the end goal may be shared but the route to that end goal may vary.

Sharing ambition in the context of this research and as it emerged through the analysis, talks of a shared end goal but with an emphasis placed much more on the importance of shared values that are integral en route. The notion of a shared ambition, and a close team, brings us to the next theme exploring how participants perceive their place in the industry, and how they perceive themselves as apart from the industry or having an approach that can be identified as different (Lange 2009).

6.3.2 feeling and being separate

The contractors on P1 expressed a desire to identify separately from the 'normal' construction industry, this need to separate out was rooted in a dissonance with professional practice, particularly an identification of a lack of interest in learning and willingness to change with the 'typical' industry as they were “willing to learn and quite interested in changing” (Contractor/engineer P1:2010). The contractors consciously operate on a level they view as being beyond their profession and this was expressed as frustration with the rate of change within the industry. Separating yourself from what you perceive as the mainstream may be a necessary tactic, a way of coping with an ethical or emotional dissonance when working in an industry that generally is not in line with your own values (Bierema 2008). Feelings of separation, or declaring yourself apart can be perceived as a way of working out an emotional self by creating distance from those who do not appear to share these same emotions (Dirkx 2001a).

Previous career experiences as a mechanic were significant in forming working practices that responded quickly to changing demands “we need to change and adapt that's what we need to do” (Contractor/engineer P1:2010), as discussed in section 4.3. The lack of adaptation and acceptance of the need for the industry to change was an increasing cause of frustration. The same contractor comments on the inability or unwillingness of the industry to accept new ways of working and new materials, the particular reference here is to building timber frame housing rather than the more conventional brick and block construction:

I think [...] if you were to take a kind of a cut through the middle of the construction industry, 90%, well not 90%, a high percentage of people are going to turn around and say that's not how we build; this is how we do it (Contractor/engineer P1:2010)

Feelings of being separate were described as either self-preservation, being apart, willing to take more of a risk, or invest more time into a project; actions that were perceived to be outside of the usual way of practice. As the engineer in P2 stated, working slightly apart from the industry by following their own values has benefited their practice, reinforcing a feeling that although they operate slightly outside of the mainstream they are in-line with their own values. A feeling of actions misaligned with values, where professional activity sits outside of a personal ethical parameter, is shared across the professions, but was particularly raised by architects, as discussed in chapter 4. Bierema (2008:57) explores this through concepts of emotional work, where the focus of her research is on an emotional forcing in certain work environments and a connection to a forced action at work through established norms, leading to emotional dissonance.

Being separate captures organisations as well as individuals. Team or organisational support can encourage individuals to operate outside of the 'norm' (Wenger 2009a), creating opportunity for learning in a cohesive and supportive social group (Jarvis 2009). As one engineer comments of their company "there's so much support as well, so you're not on your own if you do decide to do something which is slightly different" (Engineer P4:2011). This suggests that a sense of being separate is galvanising in forming a team who share the same ambition. The architects on Sp1 and Sp2 had not changed the ethos of their practices to fit in with what the world was now facing, those principles had been there from inception. Those two architects now find that their work is being recognised and receiving industry awards for an approach they have taken over several decades. After receiving the same sustainability award for four years in a row, one architect asks:

we've won the [regional] sustainability awards four years in a row which makes you think what are the other architects in [the region] doing, if we can win it four years on the go, where is everybody else? (Architect Sp2:2010)

This was clearly intended as a commentary on the industry not engaging with the issues of sustainability, rather than a comment on the practice. As the architect from

P1 comments, setting up a practice was the only way to find projects of the type they were comfortable working on and retain a separateness and independence from aspects of the industry they did not like, what the architect describes as doing his “own thing” (see section 3.1).

Being separate can apply to the project as much as the individual members of the design team. The client on P4 experienced difficulty in getting acceptance of the project at the time of construction, describing the process as an “uphill struggle” when interviewed in 2011. Noting how those perceptions had changed, and that if the same project were to have been built in 2014 “everyone would walk around it going how brilliantly cool” (Client/agent P4:2014). Separating out from the mainstream, and setting yourself apart can be a useful mechanism to create the psychological space for transformation. In her research Lange (2009) talks about creating both physical and psychological space, it is the psychological space that is created by identifying as apart, that is potentially empowering in creating transformative opportunity.

6.3.3 valuing reflection

Within this theme the role of reflection is explored as it relates to the participant experiences, where placing reflection in professional learning is discussed alongside reflective practice, highlighting learning. This theme emerges from comments where participants valued the opportunity to reflect on the project and the process. As Dewey ([1910] 1991) said “reflection involves not simply a sequence of ideas, but a consequence”. Critical reflection within professional practice has been established as significant (Schön 1991), although not without its critics (Fenwick et al. 2012). Valuing of a reflective opportunity provides support for learning theories that place an importance on critical reflection, whether as a means towards professional learning or perspective transformation. The extract below provides an example of the explicit value placed on reflection and the nature of the relationship between the two engineers, as one finishes the other's sentence:

I know, its been a really interesting chat actually, its good to look back and (Engineer/services P2:2010)

to think about this sort of stuff (Engineer/structural P2:2010)

This theme acknowledges the value placed on reflective practice, whilst acknowledging that reflection does not always lead to a transformation (Schön 1991). One of the most remarkable transformations, in the practice of the contractor in P1, was not commented on by the participant but by the architect witnessing the change in perspective. Although the contractor did not reflect on specific experiences around the air tightness testing during the interview, this does not mean there was no reflection on the events which led to the transformation in habit of mind, just that the contractor chose not to talk about it or did not identify it as significant at the time. As Kegan (2000) highlights, we do not know about prior transformations and the impact of those on the individual. Taking time to reflect can reinforce the value of experiences and actions, as the inherent value of an experience does not always present itself at the time of the encounter. As Jarvis (2010:39) states “at the very least, learning is the transformation of our experiences of living so that they affect us as persons”. Highlighting the problems with a dominant model focused on reflective practice in the workplace, Fenwick argues that this can be limiting and is not universally suitable.

separating mind from body and thinking from doing in what is essentially a narrow mentalist view of learning; over-simplifying processes of both reflection and of practice (Fenwick et al. 2012:4)

There remains a credible and established value in reflective practice that emerged from this research through the interviews where participants were invited to cast back over experiences. Although Eraut (2000) warns against attempts to capture learning through recalled experience, experience has a validity of its own, regardless of any associated learning that may or may not have arisen. It has also been argued that all learning is borne out of experience, that all learning is experiential learning (Kolb 1984). For the participants the experience of reflecting was a process in and of itself. There are explicit statements within the interviews commenting on the value of that process, and an implicit thread running through the generated knowledge. For this architect taking part in the research presented an opportunity to do something that had been discussed in the practice but that they had not found the time to formalise.

it's useful for us [...] good for us to feedback [...] we have talked about doing this in a more formal way and I think it would be good to do that actually, you know lessons learnt [...] you do take lessons and you do incorporate it but you don't necessarily incorporate, I don't necessarily incorporate what [a colleague] learnt I incorporate what I learnt (Architect/senior Sp1:2010)

There is complexity in this, the desire to formalise an otherwise informal process, and recognising the multifaceted process of learning, and that it can be a personal experience, where time and space needs to be made to share that learning. Fenwick's (2012) criticisms of imposing reflective practice do not reflect the desire illustrated above to engage in it, and the acknowledgement of the contribution to professional practice. Through the interview, which included three architects, motivations and aspirations for the work of their practice, profession and the wider community were revealed. Through discussion and reflection these participants were able to place their learning in the context of their wider working environment.

Reflection exposed an opportunity to think about personal experience as well as practice, acknowledging the task ahead by reflecting on the distance already travelled.

I think its interesting how, we've moved on since I first started practising [...] we've come so far and unfortunately I don't think we're moving quickly enough as an industry, but interview me in 15 years time (Architect Sp3:2010)

Reflection was also commented on in relation to reflection on the project, the success of the project and the importance of embedding a reflective process after completion. This emerged in the interviews as a commentary on post occupancy evaluation (POE), which can be described in terms of reflective practice, where occupants are invited to reflect on their experiences of the building in terms of use and comfort, and where this can then feed back to the design team, as well as feed forward to inform future projects. POE can be used as an assessment mechanism post completion, embedding POE into the work stages of a project might provide the opportunity to reflect on a project, to assess how the building is working, which in turn could feed into a wider reflective process within design and construction, rather than the current heuristic process. The following section comments further on the advantages and limitations of assessment and issues of compliance.

6.4 Compliance

At the outset of every interview the intention was to discuss the influence of the project and these conversations often manifested in frustration with process and a strong sense of wanting to instigate change more widely and to advance environmentally responsible behaviours. One of the features of the interviews was the offering up of solutions to these perceived industry problems, particularly with building performance and assessment, discussed in previous chapters. This was a tranche of the research not originally envisaged but that came through so strongly in the interviews that key issues emerged in relationship to the future functioning of, and change within, the industry. These themes sit under the heading compliance, as it gathers together the experiences with current regulation, looks towards future regulatory issues, and speaks of moving away from aspects of compliance and excessive regulation. The emergent themes; *pushing boundaries*, *ticking boxes*, and *anticipating change*, capture experiences that are then expressed as possible future routes to a changed profession, grounding learning in themes that comment more specifically on the nature of a complex and messy industry. With uncertain future political and economic landscapes, and changes in professional boundaries, buildings will impact on and will in turn be influenced by, the future speculated upon by those in the industry now. Figure 32 captures those themes.

	COMPLIANCE		
	PUSHING BOUNDARIES	TICKING BOXES	ANTICIPATING CHANGE
PERSON (the people):	challenging a business as usual approach	compliance is not enough	future directions and diversification, learning and new challenges
PROFESSION (architects, engineers, clients, contractors):	new ways of working across disciplines	compliance and creativity – pushing for change	professional roles changing and being challenged
PROJECT (the buildings):	challenging the norm – site specific	compliance with regulation and assessment	future proofing fabric and services

Figure 32. Compliance: emergent themes mapped against each analytical lens

6.4.1 pushing boundaries

It was important for participants to feel as though they were pushing the agenda, an example of this professional positioning comes from the client on P4, as discussed in section 4.4. When likening the green agenda to a comet, the client identifies an ideal position, of just behind the leading edge, avoiding being at the very forefront taking all the impact, and equally not so far behind that you are not “in the rubbish at the back, but in that body of energy pushing it forward” (Client/developer P4:2011). All four projects within the research were selected for this reason, that they sat just within the leading edge of the mainstream, pushing the agenda forward without being extreme leading edge projects in terms of their environmental approach. None were at the very front of the comet, P1 was probably the closest to being there but as a refurbishment project there were compliance issues associated with working within an existing envelope, alongside planning restrictions, as discussed in section 5.1. Despite the progress P1 demonstrated in terms of an energy conserving refurbishment, the slowness of transformation of the industry as a whole remained a

frustration for the architect.

The emphasis of this research is on experience, however it is acknowledged that skills are important in terms of future employment and the future direction of the industry, as well as in the process of transformation, and are listed at number seven on Mezirow's (1991:168-169) ten stages of transformation. The drive for prefabrication, captures the need for new and different skills, and is pushing the industry in a particular direction, reinforcing comments about the unwillingness of the industry to adopt new practices made in earlier chapters. Despite the frequent call from industry for an increase in skills there is a reluctance in the industry, in this contractors experience, to embrace new methods of working, and the use of new materials:

it's the same reason why there are hardly any timber homes in England, it makes perfect sense to have timber frames in the climate we live in but they won't do it because well that's not how we do it (Contractor/engineer P1:2010)

However the architect on P1 the constant questioning from the contractors reversion to what they knew would work equally frustrating.

they'll just put in things to hold things together where it's most effective but often those don't coincide with a low energy strategy so there was quite a lot of push and pull (Architect P1:2010).

The contradiction here is a need for new ways of working, pushing the boundaries of existing practice, yet at the same time a reluctance to embrace change (Bradley et al. 2010).

The design team as a whole plays a crucial role in pushing a project forward, for the architect on P1 the motivation for pushing boundaries came from a desire to pursue research:

that is why we took the job on, we took it on as a learning exercise really as an opportunity to do some research (Architect P1:2010)

Not all of the motivations for environmental behaviours are based on economic motivations, taking on a project as research, out of an interest in pushing the environmental agenda forward, and your own learning, could be described as what Evans et al. (2013) refer to as self-transcending motivations for behaviour. Taking on a job as a research opportunity, or as a way of pushing your own learning

forward as part of CPD has wider impacts, here the architect from Sp3 describes how a contractor changed position on green roof construction:

you could see the whole thing click, clicking with him, and we put in a green roof and all of a sudden he was talking about paying to put in a web camera so the kids could see [...] a rare type of bird that feeds on a particular type of green roof [...] he suddenly became involved in the process (Architect Sp3:2010)

The extract above highlights how the themes are interwoven, the architect is witnessing a transformation by pushing an environmental issue, which is then picked up and pushed further. This is also evident in P2, discussed in section 5.2, where the specification and inclusion of a green roof captured the imagination of the users and immediate community who raised the money to fund it.

However when the architect pushed on P3 this had a negative impact on the contractors perception of a material, the lime render, echoing what Fowles et al. (1994 cited in Fowles 2000:112) highlight in the profession as a frustration of ambition by convention. There was anxiety in specifying lime, and a hostility to using it, as discussed in section 5.3. The architect describes that in attempting to push the boundaries in terms of materials “we [...] lost our nerve slightly [on P3] we were very keen to push it a long way and it's interesting as a consequence” (Architect/senior P3: 2010). The interesting consequence was the learning for the architects, and the utter refusal of the contractor to work with that particular material again even though it may have benefits in terms of reuse of material and reduction in carbon emissions. *Pushing boundaries* becomes significant if the industry is ever to move beyond a compliance culture and the tick-box mentality.

6.4.2 ticking boxes

This theme sums up the problematic nature of the industry as it emerged through the interviews and in particular the approaches to building assessment. Whilst these issues do not necessarily immediately relate to learning, the force with which participants talked about their frustrations with assessment processes and outcomes was too strong to leave unacknowledged. This is a frustration not with the assessment of buildings per se, but the experience of the assessment of building performance. This section brings those anxieties together, along with frustrations regarding motivations, where it was felt others within the profession were anxious to

be seen to be green or as one client put it “others have sort of followed suit because they want to get on the coattails” (Client/agent P4:2014).

BREEAM (BRE 2014) is the industry standard in the UK for building assessment. There is general acceptance that some form of assessment is useful but that BREEAM is “a nonsense, as you can easily manipulate the system”, (Client/agent P4:2011) and that environmental measures should be meaningful rather than incidental.

it serves a purpose it allows people to measure and benchmark things but [...] this is not least about ticking boxes, just because you can get a certain rating by ticking certain boxes because you happen to be in the right location, or whatever it is, does not mean that this building matches up to credentials (Architect P4:2011)

It was felt that large UK contractors, “the big four or five”, have responded positively to BREEAM and to the idea of monitoring, and it is procurement and the supply chain that has not moved forward (Engineer P4:2011). A lack of confidence in the system, a system that it is viewed as being open to manipulation, does not appear to have impacted the industry's adoption of the standards. In 2014 there was still:

an expectation that good new buildings will be BREEAM excellent and there is going to come a point fairly soon when they won't be able to be BREEAM excellent because the part L requirements will be so restrictive (Client/agent P4:2014)

As building regulation becomes more demanding in terms of environmental performance, BREEAM as an assessment tool, and benchmark, may become less relevant (Mark 2013). In 2014 an interview with one contractor indicated a change in attitude towards BREEAM, where on a recent project, they had been working “in the spirit of BREEAM” without going through the assessment process, saving their clients the additional cost:

we are designing in the spirit of BREEAM very good we're not going to pay to have it assessed [...] you'll never know if we've got 55, 59 or 51 [BREEAM points] in reality because we're not going to submit it to the BRE because there was a saving which the client took (Contractor/builder P3:2014)

As Till (2012) notes the rhetoric is about using less when it comes to ticking an environmental box, in many ways what BREEAM and other assessment methods demand. Till argues that what is needed is a new way of thinking about sustainability, but in particular resource use. This demands new thinking in terms of

designing and building, rather than taking the same approach to construction and just using less. As Walker (2014) adds:

Perhaps the biggest personal and societal shift we have to make is from an attitude of doing and having to one of being; measuring our contribution to sustainability not by how much we can do, but by how much we can do without (Walker 2014:133).

Creating a more holistic picture of energy demand and materials within a building was thought to be more important and more complex than current assessment methods are able to reflect. It is an over simplification to suggest timber blinds are good and aluminium blinds are bad, as the engineer on P3 highlighted. The engineer on P2 captured a similar sentiment:

I think we do over talk a lot [...] for me I think the best thing we can do is design efficiently (Engineer/structural P2:2010)

Others argued for a much blunter carbon consumption measure which could be used as a comparative tool, as "that's what makes the difference, it's not a bit of grass on the roof"(Client/agent P4:2011). This takes the debate back to the design process, as the strategy for sustainable construction highlighted, design is a means by which to achieve the end of reduced environmental impact, but this has to be assessed:

The overall objective of good design is to ensure that buildings, infrastructure, public spaces and places are buildable, fit for purpose, resource efficient, sustainable, resilient, adaptable and attractive. Good design is synonymous with sustainable construction. Our aim is to achieve greater use of design quality assessment tools relevant to buildings, infrastructure, public spaces and places (BERR 2008:7).

As the quote above indicates, some form of performance indication is demanded, how this is achieved remains open for debate, particularly given that post-construction buildings rarely perform as the predictive assessment indicated, heaping further doubt and frustration on an already questioned process (Bordass et al. 2004; Foulds 2013). The Soft Landings framework offers a way forward, this requires a commitment from the construction team and the client/occupant (Way and Bunn 2009). Whereas Foulds (2013) calls for a re-framing of performance expectations, particularly where technological intervention is relied on to achieve it, which requires greater understanding not necessarily more assessment.

I finish [...] by reiterating my call for a contextual and social practice based understanding of how and why energy is consumed, the underlying influences of which should form the sole foundations of any proposed energy saving intervention (Foulds 2013:266)

Foulds, Bordass and Leaman (2012) concur that what is needed is less of a focus on compliance and more focus on understanding, knowledge, learning and a change in approach to practice.

Participants indicated that they were putting the required effort into understanding and improving the outcomes of their own projects and questioned the motivations of a tick box attitude adopted by others. Although as the client and P4 and the architect on P3 both highlighted, assessment is important in building an understanding and to support strategies, having “the numbers to prove it” (Client P4:2011). Whilst assessment is still regarded as important, especially post-occupancy, the question of cost and who pays for the assessment is critical, particularly given that some clients are already taking a saving by not going through the BREEAM assessment process. Embedding post occupancy evaluation into the work stages of a project might improve the opportunity to reflect back over a project, providing an opportunity to assess how the building is working, which in turn can feed into a reflective process of design and construction, rather than it being all based on heuristics and experience (Zapata-Lancaster 2014).

6.4.3 anticipating change

This final theme is not based on the predictions themselves but the fact the participants offered them, and lots of them. There had obviously been prior, deep, and considered thinking about the way the industry was moving, and what works and what might work better to change behaviours within the industry as a whole and into the future, as Martin et al. (2014). At the time of the phase one interviews the 2010 revisions to the building regulations had started to influence building services, at the time of the phase two interviews in 2014 the 2013 revisions to the building regulations had only recently come into effect. During each interview there were comments and criticisms of current practice, and how it might improve in terms of an environmental responsibility. These comments tended to focus on specific issues of material use, or adoption of new systems. More general comments on the industry, perceptions of change, and how the industry is slowly changing were also made,

and these are encompassed within this theme.

One concern was the retention of knowledge. The phase one interviews were conducted at a time when the recession in the industry was biting, and concern was expressed that as the money got tighter some of the environmental measure would be lost, as they were still perceived to be an added cost:

the danger is you slice off that, you know, all that good work, and you end up back with [...] just purely building regs approved boxes, I think that's the danger (Client P2:2010)

In January 2013 The Public Services (Social Value) Act (HMGovernment 2013b) became law in England, placing a duty on public bodies to consider social value ahead of procurement and requiring consideration of how public bodies can promote the social, economic, and environmental well-being of the population (Hill et al. 2012:16). There is a view that top down change through regulation is the only way to ensure people respond to the environmental crisis (Hillman and Fawcett 2004), however this top down change whether through procurement or building regulation still falls short of a more forward looking ambition:

it's very easy to get a building to pass building regulations if it's energy hungry, but then you plug in low carbon technology [...] whereas my feeling is that the emphasis should be much more on the energy, reduce the energy first and then think about what low carbon technologies you can use (Engineer/services P2:2010)

The use of biomass is provided in the interviews as a good example of regulation leading technology and the industry, an intervention that has not been maintained with the failure of both the technology and the supply chain. As a contractor reflects, biomass is temperamental so “you always put in a gas back up with them knowing that they’re temperamental” (Contractor/site P3:2011) and so users revert to the BAU, and use the gas back-up. Lack of confidence in the technology leads ultimately to its downfall, however if there are no alternatives then new technologies have to work, and the contractors and manufacturers could make those systems work “if you're having to shut [the school] for two weeks because there's no biomass boiler people would soon pull their finger out” (Contractor/site P3:2011). Technology has to work in order to be successfully, or just fully, adopted (Allen et al. 2010).

Beyond materials and renewable technologies, the way in which people experience buildings also needs to be changed. The engineer on P4 suggested this could be

achieved by adopting different comfort ranges to save energy and to help occupiers connect with the outside, by just opening windows. The engineer is looking beyond mere efficiency and building performance to comfort and user experience:

it's an extra cost on the façade and yet it's such a big part of user, you know, users experience to be able to have some control (Engineer P4:2011)

This view was supported by the the client on P4, suggesting a re-framing of internal thermal conditions and occupant expectations could reduce heat loading and air conditioning demand. As discussed in section 6.2, a lone voice advocating opening windows may remain a lone voice. To this extent Walker (2014:105) advocates change through “the attitudes of many individuals volitionally placing greater emphasis on the study, practice and living of reflective, examined lives”, as this will bring about the necessary shift in attitudes. The contractor on P1 called for change to policy and energy pricing as a way to communicate the imperative of climate change and encourage society to respond:

[...] put gas up and energy up to 17.5% or 20% [...] 30% is sensible to save energy, and until that happens no-one's going to do anything about it (Contractor/builder P1:2010)

The majority of changes within the industry are through top down actions. There were indications of bottom up change within the client interviews from P4 suggesting building users will influence commercial development, but only certain users or tenants in certain sectors. This may be an ethical response of the users and a commercial response from the developers, but as Mason (2009:3) points out this may remain elusive as:

The proper analysis would appear to be that the closer a professional is to the harsh realities of business as indicated by their position in the supply chain; the harder it is to maintain ethical standards.

There is opportunity for change and one of the crucial issues appears to be exposure to new thinking and methods, experiencing new and often challenging ways of working can influence later professional decisions. Whilst at an industry event one architect met the director of a construction company they had worked with on an earlier award winning building, the site manager introduced them, praising the techniques used and described the project as the job “where we got all those prizes, and we did all that sustainable stuff and it's really good construction”. The architect goes on to say:

And I just thought that's it, it's for this that it's all worthwhile, you know, there's that moment when you think you've actually made somebody realise that something really works (Architect/senior Sp1:2010)

Thus connecting future change with past actions through practice. The architect pushing an agenda, working with their values, the site manager reflecting on experience, and the process changing perspective into the future.

6.5 Summary

This chapter has provided an overview of the nine themes that emerge from the research, illustrating the complexity of experiences within the research, and offering opportunities where perspectives can be changed and challenged; both informing and transforming practice (Cranton 2006:143). The transformations of ambitions, working practices, individual actions, and the professional landscape of the construction industry, were explored through these nine emergent themes, described within three categories.

Commitment emerged in different ways throughout the interviews, there were notions of personal commitment to process as well as profession. The emergent themes under commitment explored the origins of ethically motivated actions, defined as the values that we live by (Fox 2009b; Pultar 2000:155). Partly we can only view the generalisations as the sitting sit the context of the generated knowledge, as *the right thing* is contested philosophical ground.

Commitment is a difficult process to internalise and explore, but does begin to reveal a space where experience and learning can inform values and behaviours (Evans et al. 2013; Schultz et al. 2005), exploring further the relationship between experience and learning, and learning and transformation. In many ways experiential learning is also contested space, with some theorists describing all learning as experiential (Kolb 1993). Just as there is contention over viewing all experience as learning, there is also contention over accepting all learning as transformative. Kegan (2009) particularly draws the distinction between transformation and information and Fenwick (2010:87) questions the difference between learning and breathing as actions we do daily and without conscious regard. Hence the importance of exploring the taken for granted within this

research, knowledge which can otherwise easily go unnoticed.

Learning and experience is often taken for granted and can be viewed as just part of the work, but can play a critical role in transformation in the workplace (Illeris 2011). Experiences and learning that inform current practice are accepted by participants and unquestioned as forming part of who we fundamentally are, reflection on experience draws attention to the significance of that experience, and the role it plays in individuation (Dirkx 2000). Learning becoming embedded in life and the taken for granted biography.

Life is full of compromise, working in the construction industry is no different, it is the impact of the compromise, both personally and professionally, within a collaborative professional landscape that is significant. Collaboration capturing issues that touch on the affective complexity of the relationships within the industry, and the compromises required to reach cooperation and agreement in transforming practice and place (Pooley and Haglund 2014). To achieve this a key theme across projects was an emphasis on the importance of clear communication. Clients, architects, contractors, engineers all talked about communication being at the root of a successful collaborative project, even when it did involve compromise, or “push and pull” as one architect described it. This was not confined to communication between team members but included communication and cooperation on an industry wide basis, captured through collaboration between and among the various professional disciplines. Collaboration in this sense is about the communication of ideas and ideals, and is not confined to language. There was a sense that where interdisciplinary conflicts arose, these were mainly with other professions, and in particular the planning profession.

Experience and reflection were found to be useful in placing learning within the context of practice. The definition of transformation as a deep and lasting change, a developmental shift or change in world view (Fisher-Yoshida et al. 2009) is explored through the ideas contained within the themes, of openness, reflection, experience, change, and transformation. How past experience influences current practice is not a linear process, it is a process reliant on reflection, where we reflect on a past experience it can bring clarity to our current experience. The key issues to take from

the many models of reflection and action is their significance for learning, and this was commented on by the participants. The opportunity to reflect on a project brought new, and often subtle, insights forward to the present.

Comments regarding compliance to regulation and assessment were not explicitly sought, but emerged in the conversations elliptically whilst participants addressed broader industry issues. Experience was expressed in ways that predicted future possibilities, highlighting the complex nature of the industry where uncertain future landscapes and professional boundaries were discussed. Experience pushed learning and practice forward through exposure to new ways of thinking and challenging methods of working, influencing professional decisions. Two examples highlighted this, one provided by the client from P2 and another from the architect from Sp1. The client identified how learning “sort of” sits in your memory until you are ready to call upon it; the architect recalled how your actions can influence others, in this case a contractor who confirmed the experience of working on Sp1 had changed his thinking, for the architect “that moment when you think you've actually made somebody realise that something really works” (Architect/senior Sp1:2010) was significant. When a tick-box mentality is challenged and existing boundaries pushed, learning and practice within the industry can move forward. The prevalence of a tick-box attitude was felt and the motivations of other actors in the industry questioned.

Every project has its own unique set of challenges as the construction industry is reliant on multidisciplinary team working. The nature of the project, and the people working on the project, is significant, having a shared collaborative ambition and a close team was found to assist in moving a project forward, particularly if that project is pushing a shared environmental agenda.

Chapter 7: Discussion

The best way to understand is to do. That which we learn most thoroughly, and remember the best, is what we have in a way taught ourselves. There are but few men, however, who are capable of doing this. They are called self-taught (Kant 1900:80).

7.0 Introduction

This chapter draws together the six previous chapters and provides a critical commentary on the implications of the research, as well as reflexively revisiting the emergent themes. Kant's words are quoted above to remind us of the emphasis on learning and experience that is threaded through the research. The self-taught in this context have been found not to be working on their own but valuing the process of working and learning with and from others. As established in earlier chapters learning occurs lifewide and extends beyond formal learning to take place as part of our everyday life. As Jarvis (2010) and Illeris (2011) emphasise learning is a social action with many levels of change and transformation, and this neither ends nor begins with formal teaching and learning processes. What this research has begun is an unravelling of experience related to environmental action, attitudes, and behaviours within the construction industry professionals where change can be linked with learning and reflective practice, as understood through the emergent themes.

7.1 Implications of the research

This research has explored the relationships between experience, learning, and transformation. The uniqueness of the research lies in a transdisciplinary approach, bringing together informal learning, environmental responsibility, and theories of transformation within professional practice (see figure 33). Thus the research contributes to existing knowledge and the debates within the construction industry that focus on behavioural change and the need to address and reduce environmental impacts, by identifying the role of experiential learning and reflection on project processes and outcomes, in shaping future practice (Owen and Mitchell 2015). The analysis of the research interviews has developed a deeper

understanding of the potential for learning and transformation within a professional context, as explored through the emergent themes in the previous chapter.

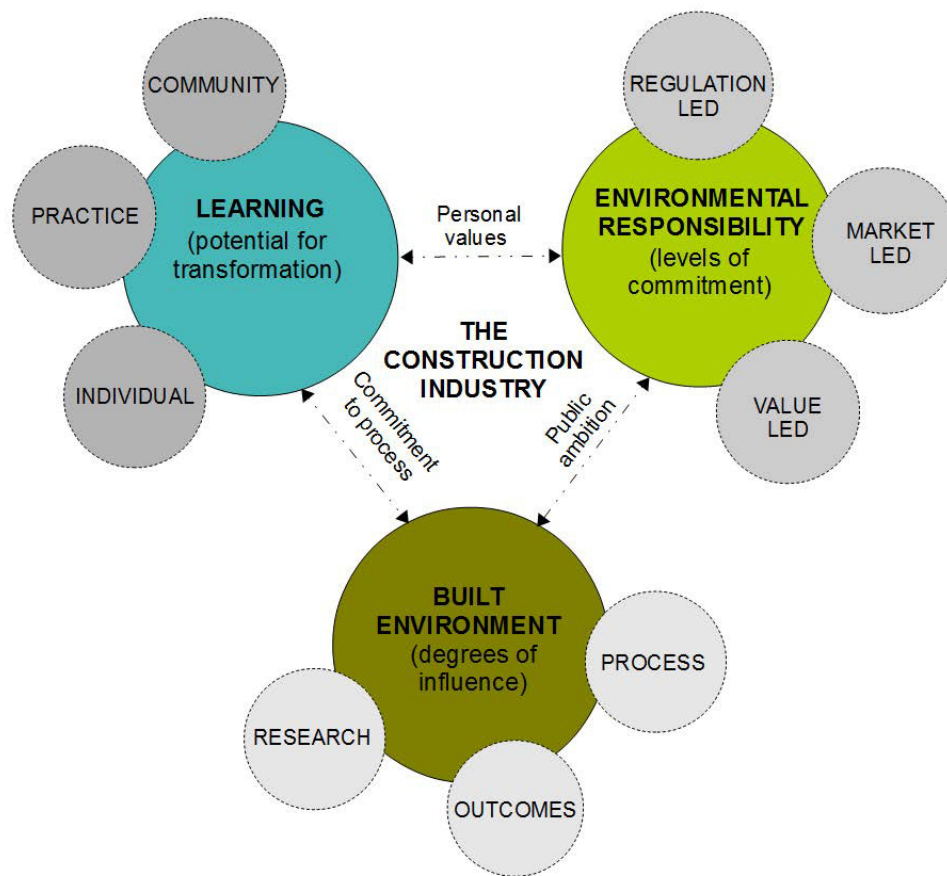


Figure 33. Realms of investigation, spheres of influence and connecting motivations

7.1.1 Typologies of transformation

One of the findings of this work is the argument for bottom up change within the industry and that this can happen when individuals are given the opportunity to reflect on their experience and learning. The transformations within this research vary, as previously discussed, the demarcation between learning and a deeper shift in perspective is often unclear. Where, if at all, those boundaries might lie remains as fuzzy within practice as it does within theory. There is no clear limina where learning shifts into value creation or perspective transformation. With transformation being more than a change through learning (Dirkx 2012; Fisher-Yoshida et al. 2009), and where learning and information is also valued in the process of change. Within the generated knowledge there are experiences that conform to the cognitive

rational approach adopted by Mezirow (2009) and others (Cranton 2006). The contractor and the airtightness test from P1 would be one such example (section 5.1), although as Mezirow's ten point list has become less significant in theory and increasingly sidelined, there is no attempt to map the rest of the stages against this contactors experience of learning and their deep shift in perspective.

Transformations took place prior to working on the projects examined here, and one can think of childhood experiences that changed thinking and directions in life, as with Arthur the architect discussed in section 3.1, and the young architect witnessing a roof leaking in their school. These could be considered as more structural developmental changes as those experiences changed frames of reference (Kegan 1994). Transformation theory reflects and accepts that there is change throughout a life, although Kegan (2014) argues that moving to a self-transforming mind only happens after mid-life, and so for the younger participants in my research perhaps this has yet to happen. Although we can examine experiences leading to transformational learning, commenting on what follows is more difficult, as Green concludes:

What is the shape of the emerging self? It depends on the person's context and the courage that they bring to it. It is a creative moment that cannot be predicted beforehand (Green 2012:215)

No one experience can neatly be mapped against a theoretical framework, and this is where the emergent themes are useful as they explore opportunities and potentials, relationships and commonalities, rather than definitives and proven correlation. In this sense the research is grounded in theory, rather than attempting to build theory. The themes provide an organising structure against which areas of transformative opportunity are further explored (see figure 34). The emergent themes appear on the left, with a corresponding opportunity for transformation on the right.

COMMITMENT	TRANSFORMATION
the deep end	experience and learning
just who I am	values and behaviours
doing the right thing	duty and society
COLLABORATION	TRANSFORMATION
sharing ambitions	like minded community
feeling and being separate	place and space for change
valuing reflection	embedded opportunity
COMPLIANCE	TRANSFORMATION
pushing boundaries	embracing difference
ticking boxes	challenging compliance
anticipating change	future reflection

Figure 34. Emergent themes and opportunities for transformation

The diagram above captures the significance of each theme as it relates to a potential opportunity for transformation; working within a liked minded community would represent an opportunity for transformation through collaboration and sharing ambition for example. Another example could be the questioning of a tick box approach, challenging compliance leading to a questioning of habits of mind, and a transformation of perspective. These relationships have been explored through previous chapters, and are revisited further within the following sections as the discussion turns to relate the research findings back to the research realms.

7.2 The built environment

As the Construction 2025 (HM Government 2013a:44) report highlights the “industry faces a pressing need for a capable workforce that can deliver transformational

change in the next decade”, the report goes on to say that “construction firms must be able to recruit and retain skilled, hard-working people in sufficient numbers” and that a workforce with new types of skills is required. This thesis moves the argument beyond skill acquisition in a response to research that has found that skills are often just recast in light of a sustainability agenda and that a changed approach towards empathetic practice is required in the industry (Bradley et al. 2010). Skills are important but they in turn need to be future proofed (Martin et al 2008 cited in UNESCO 2010). Selby argues that this change is required to build strength and resilience, only possible through “coalitions, and partnerships and dynamic synergistic interplays” (Selby 2002:90). Coalitions and dynamic synergistic interplays may not be common language in the construction industry, but the essence of this is captured through the emergent themes, particularly in *sharing ambitions*, *pushing boundaries*, and *feeling and being separate*. Developing an ecological understanding is increasingly relevant across disciplines, not just those most immediately associated with the built environment, as Jones et al. (2012) explore. The research highlights the awareness raising programmes that Selby (2002) calls restrictive, as triumphs in what could be seen as an otherwise ecologically barren landscape. These include the green roofs (P2), the biodiversity in the playgrounds (P3), and the recycling completion (P2), which were all seen as starting points for further engagement rather than ends in themselves.

Issues of influence, agency, and pressures on the process of getting something built are picked up in Pultar's (2000:157) process model of building. The original model discussed in section 1.4. is reproduced in figure 35, with my additions in orange added as a response to the research outcomes. Pultar's original model lacked the circularity he argued for in the text (Pultar 2000:156). My augmented model (figure 35) depicts a circularity in the process as well as identifying pressures from regulation and the professions that exert influence at various stages within the process, an over-arching pressure to respond to environmental factors has been included. Thus emphasising that existing pressures and regulatory frameworks are set within a framework bookended by the client. This reformed model reflects the agency of the client and end-user emergent from the research. This in turn begins to question how environmental behaviours can be influenced or activated by values, values which lead individuals, through their professional practice, to push the

boundaries of the profession. As Pultar suggests:

Despite this importance of values in the formation of ethical precepts, there appears to be no well-established, coherent and systematic framework for a discussion of value-related issues in the analysis of building(s) (Pultar 2000:155).

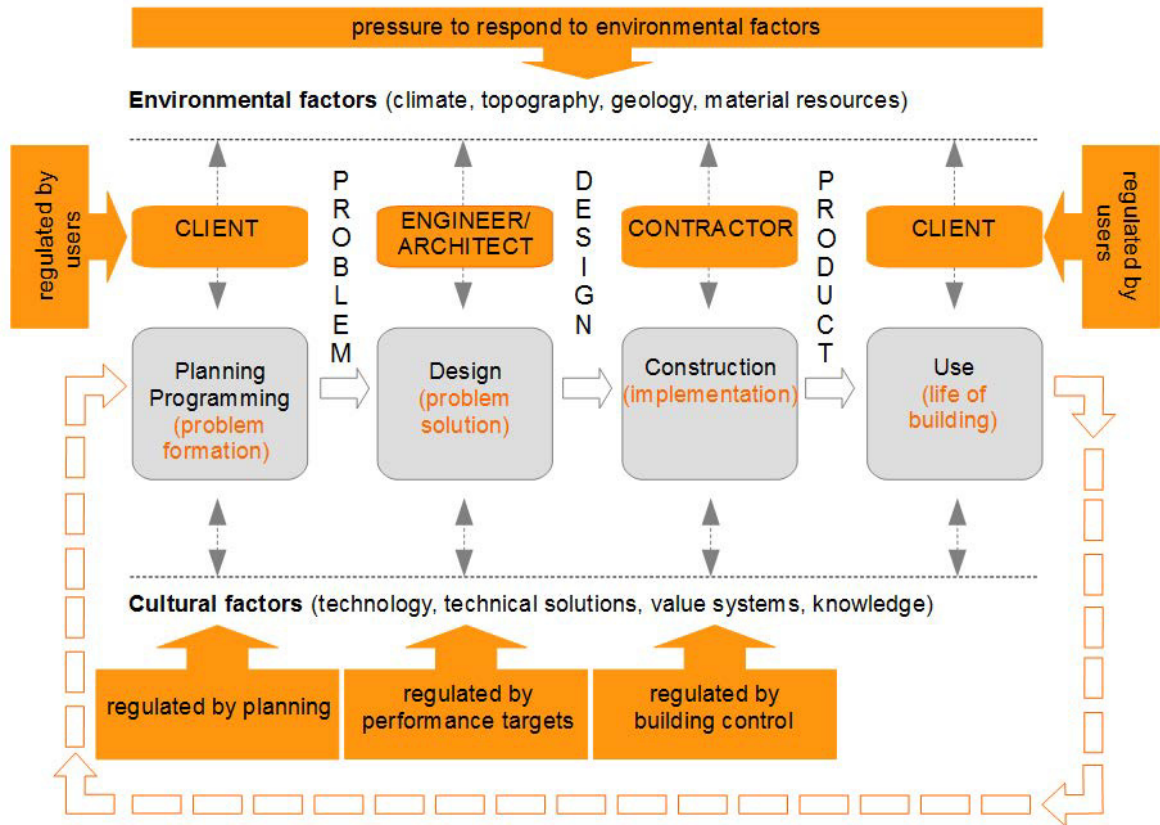


Figure 35. Process model of building after Pultar revised (2000:157)

Clarke (2013) goes some way in his study of five buildings to explain the complex relationships between buildings, users, and the impacts on environmental behaviours and building performance. He concludes from his study, focused on sustainable learning environments, that “the more we design, construct and use buildings as an experiential resource with pedagogical and behavioural change aspirations the more likely positive environmental behaviour is to occur” (Clarke 2013:377). An example of this comes from Sp3 where the contractor installed a webcam to allow school children to watch nesting birds, thus engaging in a further learning process.

If reflective practice is viewed as a new skill for the industry embedding this must not be regarded as yet another tick box exercise, or part of an otherwise flawed assessment process. Embracing a commitment to environmental responsibility and learning by supporting the professions and increasing interaction with professional learning, may go some way in developing what Sterling (2009:82) refers to as a “collective connective consciousness and competence”. As Murray (2013) reflects an holistic value led approach is important but needs to be one that is not monitored or controlled but given space to develop.

Much of the discussion here can be mapped against Bordass and Leaman's (2012:6) ten point plan for a new professionalism, particularly those points that call for open learning, honesty, reflection. As they start from a point of global concern regarding the planet and move through to concerns of the future. My own research was started prior to the list being published, and it is interesting to see overlap in findings and what they have identified is required.

Elements of a new professionalism

- 1 Be a steward of the community, its resources and the planet. Take a broad view
- 2 Do the right thing, beyond your obligation to whoever pays your fee
- 3 Develop trusting relationships, with open and honest collaboration
- 4 Bridge between design, project implementation and use. Concentrate on the outcomes.
- 5 Do not walk away. Provide follow-through and aftercare
- 6 Evaluate and reflect upon the performance in use of your work. Feed back the findings
- 7 Learn from your actions and admit your mistakes. Share your understanding openly
- 8 Bring together practice, industry, education, research and policy-making
- 9 Challenge assumptions and standards. Be honest about what you do not know
- 10 Understand contexts and constraints. Create lasting value. Keep options open for the future

(Bordass and Leaman 2012:6)

This leads back to a discussion on codes of conduct, and whilst the list is useful,

again it is another list, another ten points to tick off or work through, and my argument would be against that approach in changing values as it introduces another element of compliance, even though Bordass and Leaman emphasise this should remain voluntary. As Till (2009) has argued codes of conduct exist but we can question who they serve, bringing forth questions regarding the regulation of the construction industry.

7.2.1 Legislation and regulation

The construction industry is slowly changing, this is partly being driven by legislation but also through the market, with clients and occupiers wanting to inhabit buildings that are in line with their personal or corporate values. The four projects examined as part of this research all had a commitment to improving environmental performance beyond the demands of regulation, whether through material use, energy consumption or social impact. The projects fulfilled a wider environmental remit; responding to predicted future demands, and current emissions reduction targets. In this way these projects represent examples to the industry of how these targets can be achieved within mainstream project types. An ambitious brief and strong commitment were key to the realisation of the projects, these manifested variously in each project team.

During the course of this research an argument often encountered was that the construction industry was only likely to change through either fiscal incentive or legislation. Evidence suggests that the industry responds to both encouragement through financial incentive, and to compulsion through regulation. However this research additionally argues that these are not the only drivers of change, and that motivation for a project comes from research, and a commitment to making things better. Change cannot be reliant on legislation alone as that is unstable, as witnessed by the many changes in governmental ambitions in recent years. Since the first phase interviews there has been a huge political shift which brings about an increased uncertainty for the whole of the UK, regardless of industry, environment. Politically we appear to be moving away from a position of addressing immediate climate issues with the abolition of DECC, although internationally there is some movement towards agreement in reducing emissions (COP21). The ambition behind the continuous tightening of the building regulations, as an attempt to reduce

environmental impact towards zero carbon, is supported in this research, with some participants calling for regulations to be more stringent. A question remains over the implementation and enforcement of those ambitions, with one engineer declaring zero carbon to be “a pipe dream actually”. At the time of the interviews in 2010 Wales was still aiming for the original target of zero carbon homes by 2011, which have since been revised (Zapata-Lancaster 2014). Overall the participants viewed the building regulations as a minimum target and that meeting regulation was not enough to satisfy ambition. The contractor on P3 commented the industry needs to be “reaching the higher point”, identifying with the highest European standards.

Legislative changes and the increased demand of building regulations have raised awareness of environmental issues among some volume house-builders, commercial developers, and contractors, as evidenced by Bell (2013) and the comments made by participants during the phase two interviews. The transformation of the built environment through diverse projects, incorporating new approaches to material use, has the potential to impact on the industry as a whole. The four projects examined in this research all played a role in the debate focused on what makes a building more responsible and how can buildings in themselves inform future directions in the industry.

7.2.2 Performance and assessment

Various research projects have established that predicted and actual performance of buildings differ (Foulds 2013; Leaman and Bordass 2001; Nicol and Roaf 2005). Assessment of buildings both pre and post construction was heralded within this research as the only way to truly assess performance. As the engineer from P3 highlighted, you cannot look at a building and assume that because it has timber cladding it is 'green'. In this sense the principle of BREEAM is supported with the reality of BREEAM coming in for sharp criticism. Various described as: time consuming, producing misleading advice, misunderstood, questionable, and leading to unnecessary gadgetry, it was felt that building performance assessment, and BREEAM in particular, could lead professionals to in principle solutions that did not work in practice. Biomass was offered by more than one participant as an example of this. The frustration, lack of confidence, and expense associated with BREEAM led to some contractors rejecting it as a process. One client discussed

experimenting with other assessment tools, such as LEED, but this research suggests that clients are using in-house assessment and benchmarking tools, as they are perceived to be more company specific, more authentic and meaningful, and easier to implement, and cheaper, than current assessment tools.

It is argued through this thesis that the industry needs to look beyond assessment of performance and towards ambition and transformation of current practice. The Green Construction Board (*Low Carbon Routemap for the UK Built Environment* 2013) provide a route map to a 'greener' industry, but the notion of 'green' buildings limits the discussion and ties ambition to terminology that is difficult to define. As Guy (2000:84) suggests social accounting may prove more useful in environmental decision making as it would “engage with a range of building types” and differing contexts.

Buildings provide places to work, live and learn, and must be viewed in a holistic way, they are part of our environment, fulfilling a role not as a commodity but as shaping community. The projects are talked about here in terms that go beyond form, to address how the buildings feel; the space, light, and social spaces they create. These aspects of a project are not currently successfully assessed as Clarke (2013) highlights, and when they are too little importance is placed upon them. Assessing performance needs to be about making things better in our built environment to address those normative values of clean air and water, and a safe environment, both ecologically as well as socially and economically, that arise out of value driven research (Crompton 2013; Murray 2011) .

7.3 Learning

The learning examined within this thesis crosses several territories in that respect; higher education, workplace learning, work based learning, CPD, transformation theory and experiential learning. Learning through this research is borne out of the experiences of particular people at a particular time, and does not reflect the experiences as they happened but as they are reflected upon. Whilst this type of research is difficult to duplicate the outcomes can be explored in terms of potential impacts. Learning and experience are undergirding issues within the research, as examined through the emergent themes, which explore where and how learning

emerges through experience (figure 36 below).

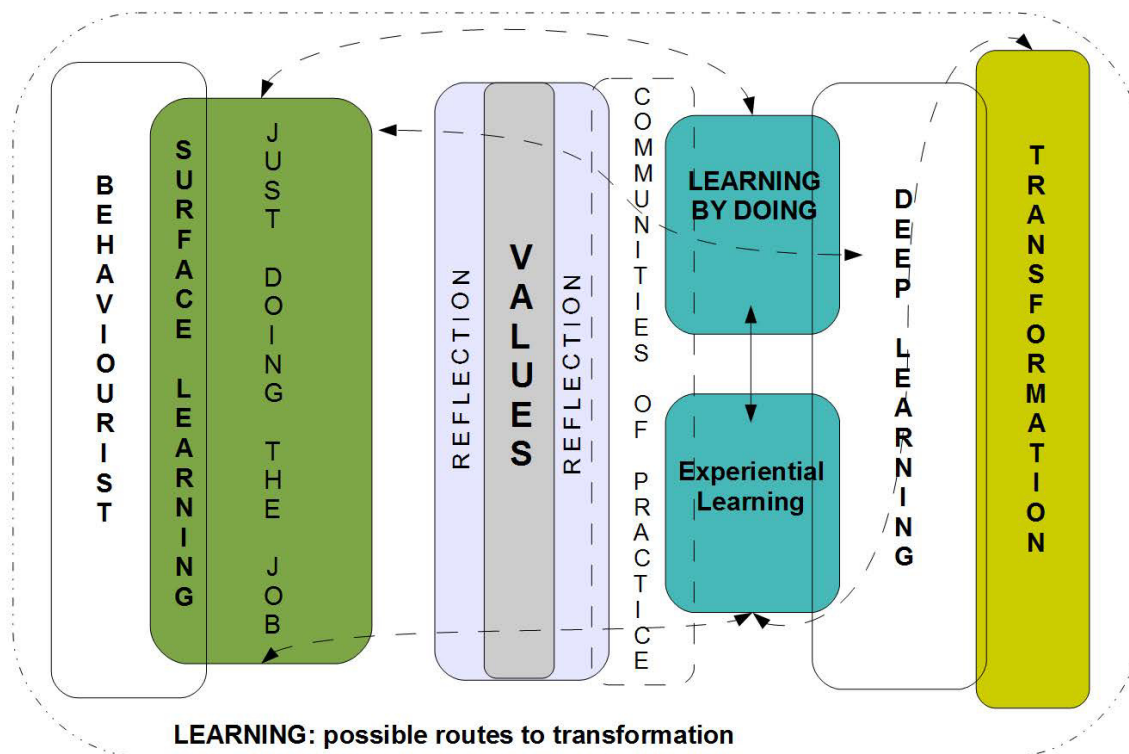


Figure 36. Possible routes through learning: from surface to deep to transformational

These journeys, indicated by dashed arrows, start to comment on some of the experiences of the participants: being exposed to new methods of working, new construction techniques, witnessing testing of the building, and realising the importance of their own work in the context of the over-all performance of the building. These moments of identified learning experiences are key in this research, particularly where there has been an influence on, or a transformation in, practice or perspective. Some of these experiences could be described as disorienting dilemmas according to Mezirow's list (2000b:22), as they are related to change, and appear to have more of an impact on the individual than information alone.

7.3.1 Informal and non-formal learning

Learning in itself is complex, and learning at work contains a diversity of approaches that are difficult to research. The airtightness test on P1 provides us with an

example where the architect witnessed learning and transformation in the contractor, but the contractor did not identify that process, and did not reflect on it during the interview. Participants talked about the importance of access to information, especially when arguing for innovative solutions, their confidence increased when reinforced by information. Learning from processes and communication were highlighted as being more significant than learning from statistical outcomes; emphasising the importance of experiential learning, working from an holistic basis and learning beyond professional confines. Illeris (2011) questions the boundaries between your job/profession and being a human being; you cannot separate out professional from citizen. His model examines the complexity of identity, particularly where work identity and practice intersect, and that it is precisely in this overlapping space “that important and transcendent accommodative and transformative workplace learning can take place” (Illeris 2011:43). As expressed by participants, experience accompanied by skill and knowledge can develop confidence, confidence leading to change not necessarily transformation, supporting Kegan's (2009) argument that information and transformation can be of equal importance in development.

Interdisciplinary working, breaking down defined discipline barriers, and working towards the same goal through a shared ambition were raised as critical aspects of a successful project (Wenger 2009a). Emphasising that knowledge in work is entwined with activity, tools, and community (Fenwick et al. 2012). A O'Hara highlights, which in many ways reflects the points made by Bordass and Leaman (Bordass and Leaman 2012):

Another key attitude in facilitators is the willingness to let go of being an “expert”, suspend assumptions, open oneself up to see things afresh, risk being vulnerable, and learn in public. It is also important to be open at least to the possibility that one might be moved to forces beyond one's ken – whether this is framed as a spiritual reality or scientific (O'Hara 2003:76).

Accepting that learning is lifelong and lifewide further research into workplace learning, specifically in the construction industry and across disciplines rather than within disciplines, could contribute to a greater understanding not only of professional learning but lifewide learning. As Walker (2014:133) suggests:

To move towards sustainability we have to move towards a more holistic understanding of looking at the world, interconnecting conventional specialities and recognising interdependence

More deep-rooted communicative, rather an instrumental, change in the industry is required to address whole person, lifewide learning, rather than just changes in process or legislation (O'Hara 2003:68).

Much of the debate around learning within the construction industry is focused on skills for sustainability (BERR 2008). Skill acquisition in construction is essential, however it is has been argued that skills and knowledge need to be in balance with an approach based in reflective practice (Moon 2004). Learning a new skill or behaviour does not necessarily transform an approach or perspective as skills tend to be delivered within a local context and focus on narrow realms. A skills only approach, which is often called for in the construction industry, is at odds with the traditional definition of learning:

Traditionally, learning has been defined as the process through which an individual acquires knowledge, skills and possibly also attitudes and opinions [...] (Illeris 2004:434).

The challenge for the built environment disciplines is to move away from prescriptive silo delivery in higher education, by developing environmental and ecological learning through reflective, collaborative, and participatory practices through professional learning (Jones et al. 2012). Chapman (2009) argues that built environment education can be developed as a 'social practice', collectively developing ideas that situate the built environment within the context of our lives; our lived experiences. He goes on to say:

The simple conclusion is that integration of analysis and problem-framing between disciplines is an essential precursor to any possible integration of decision-making. It is this that has the most transformative potential in interdisciplinary built environment education (Chapman 2009)

7.3.2 Learning as transformation

Apparent through the interviews is the importance participants placed on having an opportunity to reflect on a project, their role in it, and the values and learning that were challenged and changed during the project. Reflection and transformation are highly valued within theories of adult learning, however critical reflection, or

reflective activity, cannot be viewed as the only route to transformation, even though the relationship is an interconnected one. Transformative learning can take place in ways that do not adhere to Mezirow's ten stages, but align more generally with the importance of critical reflection within professional practice (Schön 1991), communities of practice (Wenger 1999), and lifewide learning (Jarvis 2012).

As previously discussed the relationship between reflection and transformative learning is not reciprocal, transformative learning can not happen without critical reflection but critical reflection can happen without an accompanying transformation in perspective or habit of mind (Brookfield 2000:125). Transformation or transformational learning can be anything, happen anywhere, to anyone, and can happen consciously or subconsciously (Cranton 2006; Dirkx 2001b). There are various interpretations of transformation theory, and during the course of this research it has often felt like a theory sharing many similarities with the story of the emperor's new clothes²⁸. However the critique of transformation theory and the many interpretations of it, enable it to be applied to many situations, and regardless of intermittent fuzziness, the experiences within the generated knowledge resonate with theories of transformation closely, and across several streams even if those boundaries are blurred (Dirkx 2012). Transformation in this way is an ongoing, and perhaps very often unnoticed subtlety within our lifeworld, as part of a taken for granted process. As Davis (2009) found in her exploration of expatriate communities, experiencing a cross-cultural disorienting dilemma enabled reconnection with personal identity. A parallel can be drawn with participants here, where working on an environmental project enabled a connect with environmental value and personal identity, sometimes prior held values or withheld values, which touches on issues of learning being restorative rather than transformative (Lange 2004). These changing world-views are expressed through tangible experiences of construction, building performance, and professional activity, developing an ecological consciousness and hope for the future (O'Sullivan 2008).

Within the construction industry, where there is little time or money for reflection, it is difficult to see how transformative learning could become significant. However the

²⁸ A fairy story by Hans Christian Andersen, where the emperor is duped into thinking he is wearing extravagant new clothes, leading him to parade down the road naked – as the clothes do not exist. Referring to something as *the emperor's new clothes* implies there is really nothing there or substance.

work of this thesis has demonstrated that there is great potential for reflective practice to lead to change, placing experience within context. Compared to the life of a building, or the time it takes to construct, spending a short period of time critically reflecting could yield a benefit in terms of building a professional community capable of doing things differently, which could then disseminate to a the community.

The argument put forward by Hostetler (2011) for living a philosophical life is a compelling one when it comes to learning and transcendence. Hostetler clearly warns that this should not become another tool, technique or mere focus of discourse. His ambition maps onto the arguments presented here; that there is a danger of environmental responsibility being viewed as a tool or technique rather than part of a value system or a philosophical approach, or a transformation of the industry or the built environment disciplines. However Kegan (Kegan 2009) argues that not everybody has to be transformed, and whilst there is a good argument for the industry to be transformed, that does not mean that every individual that works in it needs to undergo some form of transformation. Within this research there is evidence for transformation in perspective, but also evidence that information is just as useful in certain places at certain times to deepen understanding, or provide support for decisions. The information does not transform an individual perspective but may act in a wider transformation of the industry, or a transformation in others.

7.4 Environmental responsibility

As with the previous section, a response to our environmental predicament needs to be many fold, and cannot be confined to simple either or constructs. However it is useful to examine them as there are divergent theoretical solutions offered, particularly when finding a solution to the unrelenting catastrophic impacts we appear to be inflicting on the environment. As Meadows et al. (2005) propose, a new system may well emerge, and one that addresses all the issues raised by our environmental predicament, through a new social and physical structure. Until that natural evolution there are the intended and unintended consequences of our built environment to reconcile.

7.4.1 Technology and ecology

The current unsustainable situation is a moral and social one, rather than a technological or scientific one (Moore 2010:9). Within this research professionals reflected on changes, and were approaching change with an ecological awareness, and a technological solution, although not necessarily in equal measure on every project. This research suggests change is possible by pursuing actions in accordance our values, and that this behavioural change is possible, particularly on a project by project basis. Other research discusses similar outcomes of transformation within groups who share ethical motivations for action outside of a professional landscape (Kovan and Dirkx 2003; McDonald et al. 1999).

Orr (2004) has argued technical solutions are not free from their own energy demands and Foulds (2013) found that technology does not provide the panacea that some have hoped for. One contractor agreed, expressing his misgivings about the technical fixes adopted in very low energy demanding construction, that the ecology – human and non-human – was not being considered carefully enough in a bid to further drive down energy consumption. Buildings are primarily for people but act as containers for life, if the industry is to move forward environmental responsibility needs to be treated holistically not as a problem of ecology or technology but as philosophy. We need to break into the view that our environment is also our built environment, and that it represents a seamless move between ecology and technology.

7.4.2 Individual and collective action

Anyone who calls upon the capacity of people to practice brotherly and sisterly love, love of humanity as a whole, love of nature and of our nurturing planet, is more likely to be ridiculed than to be taken seriously. The deepest difference between optimists and pessimists is their position in the debate about whether human beings are able to operate collectively from a basis of love. In a society that systematically develops individualism, competitiveness, and short-term focus, the pessimists are in the vast majority. (Meadows et al. 2005:281)

Suggesting here a paradigm shift of significant proportions, Meadows et al. also state there are no step-by-step instructions as to how to bring about the global paradigm shift, and that actions can change if there is a good enough reason for

them to do so. The good enough reasons of the participants in this research have been explored here.

Others have argued, like Meadows, that if we cared about environmental issues, each other, and the planet, taking those feelings and actions through into our working lives would automatically manifest in a more responsible built environment (Day 2004; Orr 2007). Dunster (2013) has also argued for this, to allow the affective realm to dictate action within the industry. However basing the necessary change of a profession on the feelings of individuals is tentative and potentially unstable without a structure to support it. As one client highlighted environmental responsibility tends to rely on individuals who through experience pick up the agenda and then fight for that agenda. Which remains a necessary route for change as structural support in terms of regulation cannot be relied on to be consistent or long lasting, whereas a transformation of habit of mind remains (Mezirow 2009).

As well as the danger of relying on lone individuals to revise an industry attitude, this argument also revisits an earlier question of how people develop or acquire values. One of the clients interviewed agreed, that tackling these issues individually, whether through individual people or individual projects, will not bring the desired results, change needs to happen at scale, and at a global scale, through collective action (Jamison 2010). This research offers opportunity to capitalise on these perspectives through capturing learning experience and ethical motivation for acting, which will vary from project to project but which may always be the right thing to do if reflecting those shared values.

The question of how to engage people not only in dialogue about our environmental impacts but also engage in action, in the form of behaviour change, remains ongoing. Hillman (2004) has argued that our predicament is catastrophic, and this is where the industry has agency with regard to environmental responsibility, by ensuring buildings are not capable of being used in 'non-environmental' ways, and where post-occupancy becomes significant in the life-cycle of a building. As Martin et al. (2014:158) concluded in their research into low carbon cities and questioning the long termism of the research questions that arose out of it; "in short, history

matters, and expecting long-term change without near term action is questionable”.

The required behavioural change requires a reconnection with our environment, both built and unbuilt. Attachment to place, can be sustaining, and this is echoed briefly through an interview with a client, who notes that increasingly certain types of tenant require more environmentally responsible buildings in order to attract the staff they want; identifying a further opportunity for bottom up change.

7.5 Summary

A re-framing of the frame requires learning, experience, and reflection; a pulling apart of commercial motivations and a BAU approach, in order to address the environmental imperative, perhaps requiring a radical rethink of the industry as a whole, as Selby suggests.

"Radical" means going to the roots of things. We have to ask ourselves deeply whether we are about reform [...] or transformation. We have to ask whether our aim is to tamper with or turn around (Selby 2002:90).

Selby's argument pushes for consideration of our instinct to work in a holistic way, with our 'hearts and minds', supporting the earlier emergent themes discussed in chapter 6, specifically those concerning duty, values, and ethical motivations. The emergent themes begin to suggest that whilst there is tampering in some sectors, there is also an individual desire to turn the industry around. Developing an environmental approach to professional activities through critical reflection reaches across all professional territories. Treating environmental responsibility as an add on or a tick-box is inadequate. A long held debate within environmental education and the environmental movement is how to overcome this. Environmental responsibility, must be seen as nothing more than good professional practice, serving the client is not necessarily the same as serving the community or the wider environment, even when it is embedded in professional codes of practice.

It is argued here that learning provides a route to developing environmental responsibility, values, and ethical dialogues by challenging and transforming perspectives (Mezirow 2000b). This research accepts established theories of adult

learning and explores ways to move learning forward with reference to the construction industry. To this end learning within a professional context, in informal situations, can lead to change within the individual (Illeris 2009a), leading to another action, that of serving the self through your own values, acting with them and adjusting these through learning and experience.

Chapter 8: Conclusion

In time, a system with a new information structure is likely to change its social and physical structure too. It may develop new laws, new organizations, new technologies, people with new skills, new kinds of machines or buildings. Such a transformation need not be directed centrally; it can be unplanned, natural, evolutionary, exiting, joyful (Meadows et al. 2005:237).

8.0 Introduction

This research has investigated the experiences of twenty-seven individuals working in practice within the construction industry, with a particular focus on four projects that demonstrated the phenomenon of buildings being constructed beyond the requirements of UK building regulation. It has analysed interview transcripts to uncover experiences in taken for granted learning, encouraging reflection on practice on four particular projects, as well as a wider reflection on working within the construction industry as a whole. The work focused on the impact of experiences and as such is based on reflective recollections, and reflective predictions on future practice based on past experience, with the emphasis being on how practice and experience can respond to imperative environmental issues. There have been significant legislative and governmental changes during the period over which the research was conducted, these changes continue to give rise to uncertainty within the industry as the full impacts have yet to be felt. This concluding chapter discusses the original contribution to knowledge and the achievement of the research aims, as well as identifying limitations, and outlining further areas of research that arise out of this work.

8.1 Research aim

The aim of the research was to examine how practices within the construction industry can influence learning and change by exploring the experiences of professionals who have worked on projects that demonstrate an environmental responsibility²⁹ beyond that required by regulation. The phenomenon under exploration was that buildings with an evident commitment to environmental

²⁹ Environmental responsibility is defined by the author as; *being accountable for one's actions that in turn affect the conditions under which life is developed.*

responsibility, beyond that required by UK regulation, are built. The impact on professional practice was examined through the experiences of architects, engineers, contractors, and clients who worked on one of four building projects that embodied the phenomenon.

The objective of this research was to build on the existing understanding and interpretations of learning and transformation with specific reference to the construction industry. By bringing frameworks together that are not usually used in this context, dominant practice within the industry was questioned through the experiences of the participants.

8.2 Limitations and reflexivity

The research was informed by the phenomenological concept of the lifeworld and our physical interactions and perceptions. The research placed the construction industry in a specific framework hinged around three main realms of investigation: environmental responsibility, learning, and the built environment. These realms informed the model which guided the exploration of experiences within the interviews, which could have been limiting in terms of the debate as it focused on environmental issues, possibly neglecting other external drivers. A tension exists in this research between fact and reflection, cognition and feeling, and theory and practice. This is in part a result of using semi-structured interviews, where participants were free to explore their interests through the questions. Methods beyond the interview were considered for this research (discussed in chapter 2), however limited resources and time as well as considerations of access to participants impinged on these being adopted. Longitudinal studies, including diary keeping and participant observation used alongside interviews, could uncover learning and behaviours that questioned the normative values often derived from interviews and workshops alone. The time elapsed between phase one and phase two interviews was useful in revealing a deeper exploration of experience, and it would have been potentially enriching to the research to have been able to reinterview a greater number, if not all, of the original participants.

The research could have been conducted adopting an ethnographic approach, using mixed data collection methods, diary keeping, field notes, observational

methods, and a more limited number of projects, possibly to one or two projects, allowing for the documenting of the experiences and learning throughout the construction process. This may have given greater opportunity to interview more contractors, and not just those in management roles, and to explore the progress of the project in terms of alignment of project ambition and the as built assessment. This potentially would have involved more time (dependent on size of projects), made it harder to retain the anonymity of projects and participants, and required increased commitment from participants. Ethnographic methods would not necessarily reveal more in terms of experience or change in practice, as there may have been less opportunity to reflect back, or less time elapsed between completion of the project and reflection on the impact on practice. The relationship between experience, reflection and transformation may have emerged through different recollections, through diary keeping and field notes. An ethnographic study would also have placed the researcher in potentially transformative situations, those experiences being embedded within the research and drawing into question the role of researcher, either witnessing transformation through experience or experiencing it yourself, increasing the opportunity for reflexivity within the research. Ethnographic methods would still rely on reflective accounts unless the research or was truly embedded in the project, on a daily basis.

The research methods used in the pilot study could have been replicated with the four projects, but as discussed in chapter 2, this would have involved complexity in organisation, and may have been limiting in participants willingness or availability to participate. Time-lines could have been drawn, again these could have been completed privately and then sent to me, leading to issues of method testing, which were initiated in the earlier study, with those methods not being appropriate for the the aim.

This research explored the relationships between learning, experience, and change. The reflective nature of the research methods, the semi-structured interview, aligned with that exploration. Observing events as they happen would have involved many other factors which could potentially influence the interpretation of learning processes, eventually relying on recollection and a retelling of experience if what was happening at the time was confusing or overly complex. The reflective process

of the interview was valued, as the comments from participants bear witness. Value of reflection – hence the value of the reflective process – can only follow completion, which would be harder to achieve with diary keeping or observation, although these methods would provide different types of data.

The thesis title suggests an exploration of the UK industry, however all four projects were based in England. Whilst a lot of policy is shared across the UK there are regional differences, significantly with Wales aiming for zero carbon targets prior to England, although these ambitions were later revised. The differing legislative ambition was not considered significant enough to influence the research as the primary aim was to explore the impact of experience on practice in terms of environmental responsibility, rather than measure or monitor how projects performed against regulation, or the impact of regulation on the professions. During the interviews these issues became significant for the participants, and were commented on. A project based in Wales may have brought with it differing experiences due to legislative differences, however as the projects selected all had ambition beyond regulation this may have not been an influencing factor.

The research comments on learning and transformation, but not what follows. It may be possible, due to the nature of the industry, that experiences are being further reflected upon and future transformations within practice will take place. What cannot be established here is what impact the buildings themselves have had within the community of users. These issues come out of the interviews as the observations of the participants, and this is a good argument for interviewing more widely across all users to established wider impacts.

This research focuses on the participants, and as such is not generalisable, or replicable in terms of testing outcomes, although could be repeated with other projects and participants. The research could be repeated with the same projects, and same participants and the outcomes would vary, due to the nature of reflective practice and the fact that time has moved on. The findings are specific to the four projects and twenty-seven participants, and no claim for generalisation is made. Limited in scope and sampling, the research is not establishing a trend but rather focuses on insights and complexities, the strength of the research lies in reflective

practice and experience and the relationships with learning and transformation. Different types of learning and transformation are possible, and there would have been experiences left undisclosed. That is the perceived problem with this type of research but is also a advantage, as it revealed the experiences participants chose to talk about.

The analysis of the interviews was conducted through three lenses. This was used to bring varying perspectives into play, and to capture the complexity of experience. The three lenses emerged from the literature review, and the setting of the research boundaries. Analysis could equally have been conducted through two lenses or by focusing on the experiences as they emerged through each project in a much more descriptive way, rather than trying to capture experience from varying perspectives. On balance the three lens approach gave rise to differing aspects of the same experience and project, and led to a richer description of the generated knowledge.

From a professional perspective the industry is changing, and has to change. There is a regressive position that despite legislation the market has not kept up with environmental ambitions, and probably will not in times of financial uncertainty. One of the challenges this research highlights is how to move the debate into the mainstream industry, and engage current practitioners in reflective practice and utilise this to inform how we teach, work, and create an environment for learning and transformation (Lange 2009).

What remains to be explored further are ways in which pro-environmental behaviours can be activated within the construction industry. A deeper exploration of the participants would be required to draw any further parallels with personality types, learning, and transformation. The participants' experiences become key in their recollection and reflection, with past experience shaping an understanding of the present, and the future. In this way the process of participating in the research forms part of the past, present, and future. The experience of taking part in this research, and the impact on participants, was not explored within this thesis, which limits the discussion. Reinterviewing the participants in the future may reveal an influence, and would also build on the longitudinal quality of the research.

8.3 Recommendations for further research

This research represents a snap-shot both in and over time of the lifeworld of the participants. Since this research began the debate has shifted from being focused on energy consumption and carbon emissions, and is slowly moving towards adaptation and behaviour change. Understanding how wider environmental concerns effect individual experience, related professions, and the wider community, remains a valid research pursuit. This section examines possible directions for further research that the work of this thesis has begun.

Continued research on predicted and actual performance is vital in adjusting this gap; accepting that it will never be fully closed. Exploring learning within large multi-disciplinary teams, could lead to informing future directions of professional learning as well as potentially revealing more about the relationships between values, behaviours and individual disciplines. As well as furthering knowledge on the relationship between building occupants and pro-environmental behaviours.

An issue uniting all four professions was the underlying frustration with the rate of progress within the industry towards more environmentally responsible construction. The starting point in addressing change may well be through each individual professional but those individuals need to be supported by an industry demonstrating a preparedness to transform. Developing transdisciplinary design knowledge and understanding presents itself as an opportunity for further research and critical reflection, building on research exploring how to create space for transformative learning in professional contexts, would contribute to existing theories of how this may be overcome in a professional as well as personal context, providing an opportunity for re-examining experiential learning within professional education, and exploring alternative routes to the professions within formal education.

Collected biography has been little explored in the construction industry. Experiences of groups working on the same project as well as groups of professionals working across different projects (the work begun in chapters 4 and 5) would forward this work. An ongoing question asked here is whether professional institutions or individual professionals are the most effective agents for change.

Further research into change within the built environment professions may well reveal where resistance to change lies and where drivers really sit, pushing this research beyond professionals within the industry to suppliers and manufacturers.

Issues of adaptation to climate change and the demands of future cities are at the forefront of strategic research within the built environment disciplines. Whilst many of the issues around adaptation could potentially be resolved through the application of technology, or adjustments in building fabric, there remains a need for continued research in the field of adaptation and behaviour change. Technological fixes cannot be relied upon to resolve issues of building use, and in particular occupant health and well-being. Pushing the research of this thesis into the still rather neglected territory of post-occupancy evaluation could reveal the learning that takes place beyond construction, and this in turn could inform strategies of adaptation in relation to building users.

Buildings take a long time to conceive, construct and then inhabit, and during its life a building undergoes many transformations. Several of the participants commented that the projects they had worked on were not old enough to establish fully how successful they had been, or what influence they have had. To this end this thesis contains the beginnings of a longitudinal study whereby re-examining the projects, and reinterviewing the participants every three years would enable a detailed mapping of the transformations that had taken place and capture the shifting landscape of the industry and changes in professional territories. This work could be combined with performance data and interviews with building occupants to form a more rounded picture of the projects' impacts, informing existing research on the performance gap

As much as buildings themselves do not remain static, neither does our built environment. The beginnings of these potential transformations is evidenced in the generated knowledge, where the life of the building going forward starts to be recognised. These transformations are not confined to the building alone, but move beyond it, incorporating the context, the site and the surrounding towns and cities. Continuing the research begun here, with the same projects and participants, would enable a mapping of the process of change and transformation over a much longer

time period.

8.4 Concluding remarks

Interrogating the role learning plays in inspiring and transforming engages us in a debate rooted in environmental and social movements from the mid 1960's. Movements concerned with equity, preservation of the world's diverse ecology and resources. Reflecting on professional practice has been found to have the potential to be transformative and restorative. One of the challenges faced is using this to inform how and what we teach, how we work, and how we create environments for transformation within the professions.

There is an ongoing imperative for the construction industry to reform and for the built environment curriculum to transform. A re-framing of the frame is required to address the environmental imperative; enabling people to deal with the challenge of climate change whilst combining the additional challenges of competing political and economic systems. The construction industry needs to go beyond a focus on skills and knowledge towards a holistic approach including ethics and values, not mutually exclusive but interconnected.

We need to develop ways to embrace a commitment to environmental responsibility and learning by supporting the professions and increasing interaction with professional learning, not confine the debate to any one curriculum, but to feed into professional practice and informal learning. To develop experiences for learning and transformation through problem solving and interdisciplinary working, providing opportunities for learners to live environmentally responsible lives. Equally this commitment cannot be placed solely with future generations. Learning is complex and embraces the whole person, the lifeworld. Learning to be yourself, to respond to imperatives and values when they arise, learning from ourselves and our experiences, is what moves us forward towards those lived philosophical and environmental lives.

Environmental responsibility is not an adequate definition for the ambition or action required, the argument remains one focused on commitment to something beyond ourselves, our values, and our experiences; and begins with learning in its broadest

sense. We need to be accountable for our actions that in turn affect the conditions under which life is developed, and to build resilience through responsibility within our professions, our communities, and our wider world.

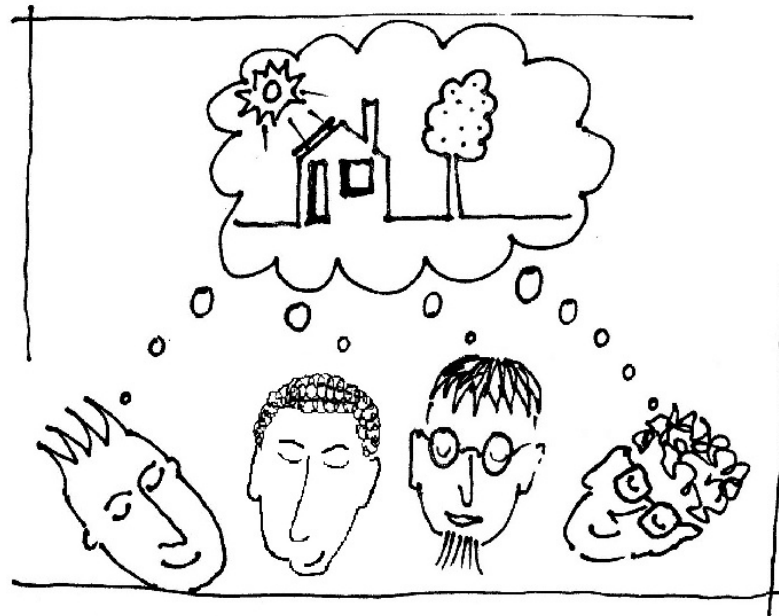


Figure 37: A shared ambition – dream and reality

Almost everybody feels at peace with nature: listening to the ocean waves against the shore, by a still lake, in a field of grass, on a windblown heath. One day [...] we shall feel the same about our towns, and we shall feel as much at peace in them, as we do today walking by the ocean, or stretched out in the long grass of a meadow (Alexander 1979:549).

References

- Ainsworth, M. and Bowlby, J. 1991. An ethological approach to personality development. *American Psychologist* [online], 46(4). Available at: http://www.psychology.sunysb.edu/attachment/online/ainsworth_bowlby_1991.pdf [Accessed: 1st January 2007].
- Ainsworth, M. D. S. 1978. *Patterns of attachment : a psychological study of the strange situation*. New Jersey ; New York ; London: Wiley.
- Ainsworth, M. S. 1979. Infant–mother attachment. *American Psychologist* [online], 34(10). Available at: <http://search.ebscohost.com/login.aspx?direct=true&db=pdh&AN=1980-09337-001&site=ehost-live> [Accessed: 4th April 2015].
- Alexander, C. 1979. *The timeless way of building*. New York: Oxford University Press.
- Alexander, C. and Ishikawa, S. and Silverstein, M. 1977. *A pattern language : towns, buildings, construction*. New York: Oxford University Press.
- Alheit, P. 2009. Biographical learning - within the new lifelong learning discourse. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st. ed. London: Routledge, pp. 116-128.
- Allen, D. and Murphy, C. F. and Allenby, B. R. and Davidson, C. I. 2010. Engineering sustainable technologies. In: Moore, S.A. ed. *Pragmatic sustainability : theoretical and practical tools*. 1st ed. London: Routledge, pp. 106-115.
- Allen, M. and Spandler, H. and Prendergast, Y. and Froggett, L. 2015. *Landscapes of helping : kindness in neighbourhoods and communities* [online], York. UCLAN/Jospeh Rowntree Foundation. Available at: <http://www.jrf.org.uk/sites/files/jrf/landscapes-helping-kindliness-full.pdf> [Accessed: 3rd May 2015].
- Altomonte, S. 2010. State of the art of environmental sustainability in professional practice. *EDUCATE* [online]. Available at: <http://www.educate-sustainability.eu/state-of-the-art.php>.
- Anells, M. 2006. Triangulation of qualitative approaches: hermeneutical phenomenology and grounded theory. *Journal of Advanced Nursing* [online], 56(1). Available at: <http://dx.doi.org/10.1111/j.1365-2648.2006.03979.x> [Accessed: 15th February 2011].
- ARB. 2014. *Code of conduct 2010*. [online]. Available at: <http://www.arb.org.uk/code-of-conduct-2010-Standard5> [Accessed: 30th September 2014]

- ARUP. 2013. *UK energy legislation timeline*. [online]. ARUP. Available at: http://www.arup.com/~link.aspx?_id=3A98E672C7D5425B8916F1FCE7779989&_z=z [Accessed: 13th June 2014]
- Atkinson, P. and Delamont, S. 2006. Rescuing narrative from qualitative research. *Narrative Inquiry* [online], 16. Available at: <http://www.ingentaconnect.com/content/jbp/nari/2006/00000016/00000001/art00020> <http://dx.doi.org/10.1075/ni.16.1.21atk> [Accessed: 12th May 2011].
- Atkinson, R. 2010. Architecture at A-level. *arq: Architectural Research Quarterly* [online], 14(03). Available at: <http://dx.doi.org/10.1017/S1359135510001028> [Accessed: 25th January 2011].
- Awan, N. and Schneider, T. and Till, J. 2011. *Spatial agency : other ways of doing architecture*. London: Routledge.
- Bachelard, G. and Jolas, M. [1958] 1994. *The poetics of space*. Boston: Beacon Press.
- Baker, N. and Steemers, K. 2002. *Daylight design of buildings*. London: James & James.
- Batel, S. and Devine-Wright, P. 2015. Towards a better understanding of people's responses to renewable energy technologies: Insights from Social Representations Theory. *Public Understanding of Science* 24(3), pp. 311-325.
- Bauman, I. 2008. *Bauman Lyons Architects: How to be a happy architect*. London: Black Dog.
- Bell, M. 2013. Building homes that make people happy. *Architect's Journal: The Green Rethink* [online]. Available at: <http://m.architectsjournal.co.uk/Video/8657064> [Accessed: 15th February 2014].
- Berger, P. L. and Luckmann, T. 1979. *The social construction of reality : a treatise in the sociology of knowledge*. Harmondsworth: Penguin.
- BERR. 2008. *Strategy for Sustainable Construction* [online], Strategic Forum for Construction. Available at: <http://www.bis.gov.uk/files/file46535.pdf> [Accessed: 20th May 2014].
- Betts, M. and Robinson, G. and Burton, C. and Leonard, J. and Shards, A. 2013. *Global Construction 2025 Executive Summary* [online], London. Oxford Economics & Global Construction Perspectives. Available at: <http://www.globalconstruction2025.com/> [Accessed: 11th February 2014].
- Bierema, L. L. 2008. Adult Learning in the Workplace: Emotion Work or Emotion Learning? *New directions for adult and continuing education* [online], Winter 2008(Number 120). Available at: <http://onlinelibrary.wiley.com/doi/10.1002/ace.316/abstract> [Accessed: 9th November 2011].

Biggs, J. B. 2003. *Teaching for quality learning at university : what the student does*. 2nd ed. Buckingham: Open University Press.

Blewitt, J. 2015. *Understanding sustainable development*. London: Routledge.

Boardman, B. 2010. *Fixing fuel poverty : challenges and solutions*. London: Earthscan.

Bordass, B. and Cohen, R. and Field, J. eds. 2004. *Energy performance of non-domestic buildings : closing the credibility gap* [online]. Building Performance Congress. Frankfurt. Available at: <http://www.usablebuildings.co.uk/Pages/Unprotected/EnPerfNDBuildings.pdf> [Accessed: 3rd July 2014].

Bordass, B. and Leaman, A. 2012. A new professionalism: remedy or fantasy? *Building Research & Information* [online], 41(1). Available at: <http://dx.doi.org/10.1080/09613218.2012.750572> [Accessed: 3rd July 2014].

Boud, D. and Keogh, R. and Walker, D. 1985. *Reflection : turning experience into learning*. London: Kogan Page.

Boud, D. and Solomon, N. 2001. Future directions for work-based learning : reconfiguring higher education. In: Boud, D. and Solomon, N. eds. *Work-based learning : a new higher education?* Buckingham: Society for Research into Higher Education & Open University Press.

Boud, D. and Solomon, N. 2003. 'I don't think I am a learner' : acts of naming learners at work. *Journal of Workplace Learning* [online], 15(7/8). Available at: <http://www.emeraldinsight.com.proxy-lib.anglia.ac.uk/journals.htm?articleid=882300> [Accessed: 24th June 2014].

Bradley, J. F. and Sayce, S. and Lewis, A. 2010. Sustainability and built environment professionals: A shifting paradigm. In: Jones, P. and Selby, D. and Sterling, S.R. eds. *Sustainability education: Perspectives and practice across higher education*. Abingdon: Earthscan.

BRE. 2014. *BREEAM*. [online]. Available at: <http://www.breeam.org/> [Accessed: 21st May 2014]

Brook, I. 2000. Can 'spirit of place' be a guide to ethical building? . In: Fox, W. ed. *Ethics and the built environment*. London ; New York: Routledge, pp. 139-151.

Brookfield, S. 2000. Transformative learning as ideology critique. In: Mezirow, J. ed. *Learning as Transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco, Calif.: Jossey-Bass Inc, pp. 125-148.

Carlile, O. and Jordan, A. 2005. It works in practice but will in work in theory? the theoretical underpinning of pedagogy. [e-book]. In: O'Neill, G. and Moore, S. and McMullin, B. eds. *Emerging issues in the practice of university learning and teaching*. Available at: <http://eprints.teachingandlearning.ie/2917/1/McCarthy%20and%20Higgs%202005.pdf#page=21> [Accessed: 9th September 2016].

References

Carrus, G. and Scopelliti, M. and Fornara, F. and Bonnes, M. and Bonaiuto, M. 2014. Place attachment, community identification, and pro-environmental engagement. In: Manzo, L. and Devine-Wright, P. eds. *Place attachment : advances in theory, methods, and applications*. Oxford: Routledge, pp. 154-164.

Carson, R. 1962. *Silent Spring*. London: Harmondsworth : Penguin in association with Hamilton (1982 [printing]).

Chalmers, P. 2014. *Climate Change: Implications for Buildings : Key Findings from the Intergovernmental Panel on Climate Change Fifth Assessment Report* [online], Cambridge. Cambridge Institute for Sustainable Leadership. Available at: http://www.cisl.cam.ac.uk/business-action/low-carbon-transformation/ipcc-briefings/pdfs/briefings/IPCC_AR5__Implications_for_Buildings__Briefing__WEB_EN.pdf [Accessed: 7th July 2014].

Chao, R. ed. 2009. *Understanding the adult learners' motivation and barriers to learning* [online]. ESREA E-Book Conference Proceedings, . Available at: https://www.academia.edu/1267765/Understanding_the_Adult_Learners_Motivation_and_Barriers_to_Learning.

Chapman, D. 2009. Knowing our Places? Contexts and edges in integrating disciplines in built environment education. *Journal for Education in the Built Environment* [online], 4(2). Available at: <http://journals.heacademy.ac.uk/doi/pdf/10.11120/jebe.2009.04020009> [Accessed: 9th March 2010].

Chapman, J. 2013. *Work, life and sustainable living: How work, household and community life interact to affect environmental behaviours and outcomes* [online], Adelaide. Centre for Work+ Life, University of South Australia. Available at: https://atn.edu.au/PageFiles/34117/Work,%20life%20and%20Sustainable%20Living%20Report_Final.pdf [Accessed: 3rd May 2015].

Chapman, J. and Skinner, N. and Searle, S. 2013. Working towards sustainability : exploring the workplace as a site for pro-environmental behavioural change. In: Crocker, R. and Lehmann, S. eds. *Motivating change : sustainable design and behaviour in the built environment*. Oxon: Routledge.

Charmaz, K. 2006. *Constructing grounded theory*. London: Sage.

Charmaz, K. 2008. Grounded Theory. In: Denzin, N.K. and Lincoln, Y.S. eds. *Strategies of qualitative inquiry*. 3rd ed. ed. London: SAGE, pp. x, 427 p.

Charmaz, K. 2013. Grounded theory methods in social justice research. In: Denzin, N.K. and Lincoln, Y.S. eds. *Strategies of qualitative inquiry*. Fourth Edition. ed. London: Sage, pp. 291-336.

CIBSE. 2015. *The code of professional conduct*. [online]. Chartered Institute of Building Services Engineers. Available at: <http://www.cibse.org/getmedia/3b0918b5-eda3-4cda-b89f-274f6742a6c9/CIBSE-Code-of-Professional-Conduct.pdf.aspx> [Accessed: 15th May 2015]

Clark, T. 2015. *AJ housing survey: post-occupancy not on architects' radar*. Architect's Journal. 13th February 2015. [online]. Available at: http://www.architectsjournal.co.uk/8678486.article?WT.src=email&WT.mc_id=Newsletter2 [Accessed: 13th February 2015].

Clarke, J. L. 2013. *To what extent do sustainable buildings encourage sustainable behaviour through their design, construction, operation and use?* PhD Thesis, Kingston University.

Clegg, S. 2013. *The challenges of analysing qualitative data*. SRHE seminar [unpublished].

Coffey, A. and Atkinson, P. 1996. *Making sense of qualitative data : complementary research strategies*. London: Sage.

Colardyn, D. and Bjornavold, J. 2004. Validation of formal, non-formal and informal learning: policy and practices in EU member states. *European Journal of Education* [online], 39(1). Available at: <http://dx.doi.org/10.1111/j.0141-8211.2004.00167.x> [Accessed: 18th August 2016].

Constructing excellence: what is a framework? 2015. [online]. Available at: <http://constructingexcellence.org.uk/tools/frameworkingtoolkit/what-is-a-framework/> [Accessed: 6th June 2015]

Cranton, P. 1996. *Professional development as transformative learning : new perspectives for teachers of adults*. 1st ed. San Francisco: Jossey-Bass.

Cranton, P. 2006. *Understanding and promoting transformative learning : a guide for educators of adults*. San Francisco: Jossey-Bass.

Cranton, P. 2009. From tradesperson to teacher: a transformative transition. In: Taylor, E.W. and Mezirow, J. eds. *Transformative learning in practice: insights from community, workplace, and higher education*. San Francisco: Jossey-Bass, pp. 182-190.

Creswell, J. W. 2013. *Qualitative inquiry and research design: Choosing among five approaches*. 3rd ed. London: Sage.

Crompton, T. 2013. Behaviour change: a dangerous distraction. In: Crocker, R. and Lehmann, S. eds. *Motivating change : sustainable design and behaviour in the built environment*. Oxon: Routledge.

Daloz, L. A. P. 2000. Transformative Learning for the Common Good. In: Mezirow, J. ed. *Learning as Transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco, Calif.: Jossey-Bass Inc, pp. 103-124.

Davenport, J. 1993. Is there a way out of the andragogy morass? In: Thorpe, M. and Edwards, R.J. and Hanson, A. eds. *Culture and processes of adult learning : a reader*. London: Routledge in association with the Open University, pp. 109-117.

- Davis, A. 2009. Socially constructing a transformed self-view and worldview In: Fisher-Yoshida, B. and Geller, K.D. and Schapiro, S.A. eds. *Innovations in transformative learning : space, culture, & the arts*. New York ; Oxford: Peter Lang, pp. 133-152.
- Day, C. 2004. *Places of the Soul : architecture and environmental design as a healing art*. 2nd ed. Oxford: Architectural Press.
- Day, C. and Parnell, R. 2002. *Consensus design*. Oxford: Architectural.
- DCLG. 2012. National Planning Policy Framework. Department of Communities and Local Government. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60777/2116950.pdf [Accessed: 15th February 2014].
- DCLG. 2014. Housing Standards Review. Department of Communities and Local Government. Available at: <https://www.gov.uk/government/publications/building-regulations-housing-standards-review> [Accessed: 17th March 2014].
- DECC. 2013. Domestic Green Deal and Energy Company Obligation in Great Britain, Monthly report. Department of Energy and Climate Change. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/259374/Statistical_Release_-_Green_Deal_and_Energy_Company_Obligation_in_Great_Britain_-_19_Nov_2013.pdf [Accessed: 30th November 2013].
- Denzin, N. K. 1997. *Interpretive ethnography : ethnographic practices for the 21st century*. Thousand Oaks, Calif. ; London: Sage Publications.
- Denzin, N. K. and Lincoln, Y. S. 2013. Introduction : the discipline and practice of qualitative research. In: Denzin, N.K. and Lincoln, Y.S. eds. *Strategies of qualitative inquiry*. Fourth Edition. ed. London: Sage, pp. 1-41.
- Dewey, J. [1910] 1991. *How we think : a restatement of the relation of reflective thinking to the educative process*. New York: Prometheus Books.
- Dewey, J. [1938] 1997. *Experience and education*. New York: Touchstone.
- Dirkx, J. M. 2000. Transformative learning and the journey of individuation. *ERIC digest* [online], 223. Available at: <http://calpro-online.org/eric/docs/dig223.pdf> [Accessed: 20th May 2010].
- Dirkx, J. M. 2001a. Images, Transformative Learning and the Work of Soul. *Adult Learning* 12(3), pp. 15-17.
- Dirkx, J. M. 2001b. The power of feelings: emotion, imagination, and the construction of meaning in adult learning. *New directions for adult and continuing education* [online], 2001(89). Available at: <http://onlinelibrary.wiley.com/doi/10.1002/ace.9/pdf> [Accessed: 13th February 2014].

- Dirkx, J. M. 2006. Engaging emotions in adult learning: A Jungian perspective on emotion and transformative learning. *New directions for adult and continuing education* [online], 2006(109). Available at: <http://dx.doi.org/10.1002/ace.204> [Accessed: 29th March 2014].
- Dirkx, J. M. 2008. Adult learning and the emotional self. *New Directions for Adult and Continuing Education* Winter 2008(120), p. 95 p.
- Dirkx, J. M. 2012. Self-Formation and Transformative Learning: A Response to "Calling Transformative Learning Into Question: Some Mutinous Thoughts," by Michael Newman. *Adult Education Quarterly* [online], 62(4). Available at: <http://aeq.sagepub.com/content/62/4/399.short> [Accessed: 14th November 2013].
- Dirkx, J. M. and Mezirow, J. and Cranton, P. 2006. Musings and Reflections on the Meaning, Context, and Process of Transformative Learning: A Dialogue Between John M. Dirkx and Jack Mezirow. *Journal of Transformative Education* [online], 4(2). Available at: <http://jtd.sagepub.com/cgi/content/abstract/4/2/123> [Accessed: 29th October 2007].
- Doucet, I. and Cupers, K. 2009. Agency in architecture: Reframing criticality in theory and practice. *Footprint* 3(1), pp. 1-6.
- du Plessis, C. 2013. Using the long lever of value change. In: Crocker, R. and Lehmann, S. eds. *Motivating change : sustainable design and behaviour in the built environment*. Oxon: Routledge.
- Dunleavy, P. 2003. *Authoring a PhD : how to plan, draft, write, and finish a doctoral thesis or dissertation*. New York: Palgrave Macmillan.
- Dunster, B. 2013. *Architect's Journal: The Green Rethink Conference*. Seminar [unpublished].
- Edwards, B. and Naboni, E. 2013. *Green buildings pay: design, productivity and ecology*. London: Routledge.
- Elkjaer, B. 2009. Pragmatism: a learning theory for the future. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st. ed. London: Routledge, pp. 74-89.
- Eraut, M. 1994. *Developing professional knowledge and competence*. London: Falmer.
- Eraut, M. 2000. Non-formal learning and tacit knowledge in professional work. *British Journal of Educational Psychology* [online], 70(1). Available at: <http://dx.doi.org/10.1348/000709900158001> [Accessed: 5th April 2015].
- Evans, L. and Maio, G. R. and Corner, A. and Hodgetts, C. J. and Ahmed, S. and Hahn, U. 2013. Self-interest and pro-environmental behaviour. *Nature Climate Change* [online], 3(2). Available at: <http://dx.doi.org/10.1038/nclimate1662> [Accessed: 20th May 2014].

Fan, L. and Ho, C. and Ng, V. 2001. A study of quantity surveyors' ethical behaviour. *Construction Management and Economics* [online], 19(1). Available at: <http://dx.doi.org/10.1080/014461901452058> [Accessed: 3rd March 2015].

Farrell, T. 2014. *The Farrell Review of Architecture and the Built Environment* [online], Farrells/Department for Culture, Media & Sport. Available at: <http://www.farrellreview.co.uk/download> [Accessed: 28th May 2014].

Fenwick, T. 2010. Workplace 'learning' and adult education. *RELA* [online], 1(1-2). Available at: http://www.rela.ep.liu.se/issues/10.3384_rela.2000-7426.201011/rela0006/ [Accessed: 26th August 2011].

Fenwick, T. and Nerland, M. and Jensen, K. 2012. Sociomaterial approaches to conceptualising professional learning and practice. *Journal of Education and Work* [online], 25(1). Available at: <http://www.tandfonline.com/doi/abs/10.1080/13639080.2012.644901?journalCode=cjew20> [Accessed: 19th May 2014].

Fisher-Yoshida, B. and Geller, K. D. and Schapiro, S. A. 2009. Introduction: New Dimensions in Transformative Education In: Fisher-Yoshida, B. and Geller, K.D. and Schapiro, S.A. eds. *Innovations in transformative learning : space, culture, & the arts*. New York ; Oxford: Peter Lang, pp. 1-19.

Foulds, C. 2013. *Practices and technological change : the unintended consequences of low energy dwelling design*. PhD Thesis, University of East Anglia.

Fowles, B. 2000. Transformative architecture. In: Fox, W. ed. *Ethics and the built environment*. London ; New York: Routledge, pp. 102-114.

Fox, W. 2000. Towards an ethics (or at least a value theory) of the built environment. In: Fox, W. ed. *Ethics and the built environment*. London ; New York: Routledge, pp. 207-221.

Fox, W. 2009a. Architecture Ethics. In: Olsen, J.-K.B. and Pedersen, S.A. and Hendricks, V.F. eds. *A companion to the philosophy of technology*. Chichester: Wiley-Blackwell, pp. 387-391.

Fox, W. 2009b. Ethics, Architecture, Responsive Cohesion, and the Transition to a More Habitable Future. *Ethics and the Built Environment* [online]. Available at: http://www.warwickfox.com/files/2009_eb_nott_conf.pdf.

Franz, N. 2010. Catalyzing employee change with transformative learning. *Human Resource Development Quarterly* [online], 21(1). Available at: <http://dx.doi.org/10.1002/hrdq.20033> [Accessed: 26th August 2010].

Freeman, M. P. 1993. *Rewriting the self : history, memory, narrative*. London: Routledge.

Freire, P. [1970] 1996. *Pedagogy of the oppressed*. London: Penguin.

Freire, P. [1974] 2008. *Education for critical consciousness*. London: Continuum.

Gillham, B. 2000. *The research interview*. London: Continuum.

Gillham, B. 2005. *Research interviewing : the range of techniques*. Maidenhead: Open University Press.

Giorgi, A. 1992. Description versus Interpretation: Competing Alternative Strategies for Qualitative Research. *Journal of Phenomenological Psychology* 23(2), pp. 119-135.

Giorgi, A. 1999. A Phenomenological Perspective On Some Phenomenographic Results On Learning. *Journal of Phenomenological Psychology* 30(2), pp. 68-93.

Girardet, H. 2008. *Cities people planet : urban development and climate change*. 2nd ed. Chichester Wiley.

Green, L. 2012. Transformative learning: a passage through the liminal zone. [e-book]. In: Bainbridge, A. and West, L. eds. *Psychoanalysis and Education: Minding a Gap*. Available at: <http://site.ebrary.com/lib/anglia/docDetail.action> [Accessed: 24th February 2014].

Griffith, M. and Jefferys, P. 2013. *Solutions for the housing shortage: how to build the 250,000 homes we need each year* [online], Available at: http://england.shelter.org.uk/__data/assets/pdf_file/0011/689447/Solutions_for_the_housing_shortage_-_FINAL.pdf [Accessed: 14th June 2014].

Guy, S. and Farmer, G. 2000. Contested Constructions: the competing logics of green building and ethics. In: Fox, W. ed. *Ethics and the built environment*. London: Routledge, pp. 73-87.

Guy, S. and Moore, S. A. 2007. Sustainable Architecture and the Pluralist Imagination. *Journal of Architectural Education* [online], 60(4). Available at: <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1531-314X.2007.00104.x> [Accessed: 12th May 2007].

Hammersley, M. and Gomm, R. 2008. Assessing the radical critique of interviews. In: Hammersley, M. ed. *Questioning qualitative inquiry : critical essays*. London: SAGE, pp. 89-100.

Harris, C. and Borer, P. 2005. *The whole house book : ecological building design & materials*. 2nd ed. Machynlleth: Centre for Alternative Technology.

Hartenberger, U. and Lorenz, D. and Lützkendorf, T. 2012. A shared built environment professional identity through education and training. *Building Research & Information* [online], 41(1). Available at: <http://dx.doi.org/10.1080/09613218.2013.736202> [Accessed: 4th July 2014].

Hatherley, O. 2014. "What is it exactly we're protesting about?". de zeen. 7th July 2014. [online]. Available at: <http://www.dezeen.com/2014/07/07/owen-hatherley-opinion-zaha-hadid-heydar-aliyev-designs-of-the-year/> [Accessed: 22nd February 2015].

References

Heschong, L. 1979. *Thermal delight in architecture*. Cambridge ; Mass.: M.I.T. Press.

Hill, S. and Lorenz, D. and Dent, P. and Lützkendorf, T. 2012. Professionalism and ethics in a changing economy. *Building Research & Information* [online], 41(1). Available at: <http://dx.doi.org/10.1080/09613218.2013.736201> [Accessed: 4th July 2014].

Hillman, M. 2014. *Global warming: where do we go from here?* [video online]. CFI UK. Available at: http://www.youtube.com/watch?v=r7uuKrUdLH8&feature=youtube_gdata [Accessed: 13th June 2014]

Hillman, M. and Fawcett, T. 2004. *How we can save the planet*. London: Penguin.

HMGovernment. 2012. *Building information modelling* [online], Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/34710/12-1327-building-information-modelling.pdf [Accessed: 2nd May 2015].

HMGovernment. 2013a. *Construction 2025* [online], Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210099/bis-13-955-construction-2025-industrial-strategy.pdf [Accessed: 20th May 2014].

HMGovernment. 2013b. *Social value act: information and resources*. [online]. Available at: <https://www.gov.uk/government/publications/social-value-act-information-and-resources/social-value-act-information-and-resources> [Accessed: 4th July 2014]

HMGovernment. 2014. *Improving the energy efficiency of buildings and using planning to protect the environment*. [online]. Available at: <https://www.gov.uk/government/policies/improving-the-energy-efficiency-of-buildings-and-using-planning-to-protect-the-environment/supporting-pages/code-for-sustainable-homes> [Accessed: 17th June 2014]

Holmes, T. and Blackmore, E. and Hawkins, R. and Wakeford, T. 2011. Common cause handbook. [e-book] PIRC. Available at: [http://valuesandframes.org/download/reports/Common%20Cause%20Handbook\(2\).pdf](http://valuesandframes.org/download/reports/Common%20Cause%20Handbook(2).pdf) [Accessed: 14th May 2015].

Holstein, J. A. and Gubrium, J. F. 2013. The constructionist analytics of interpretive practice. In: Denzin, N.K. and Lincoln, Y.S. eds. *Strategies of qualitative inquiry*. Fourth Edition. ed. London: Sage, pp. 253-289.

Hopkins, R. 2008. *The transition handbook : from oil dependency to local resilience*. Totnes: Green.

Hostetler, K. D. 2011. *Seducing souls : education and the experience of human well-being*. London: Continuum.

Huckle, J. and Sterling, S. R. eds. 2008. *Education for sustainability*. London: Earthscan.

Husén, T. 2001. Burrhus Frederic Skinner. In: Palmer, J. ed. *Fifty modern thinkers on education : from Piaget to the present day*. London: Routledge.

Hycner, R. 1985. Some guidelines for the phenomenological analysis of interview data. *Human Studies* 8(3), pp. 279-303.

ICE. 2015. *ICE Code of professional conduct*. [online]. The Institution of Civil Engineers. Available at: <https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/About%20Us/ice-code-of-professional-conduct.pdf> [Accessed: 15th June 2015]

Illeris, K. 2004. A model for learning in working life. *Journal of Workplace Learning* [online], 16(8). Available at: <http://www.emeraldinsight.com/journals.htm?articleid=882337&show=abstract> [Accessed: 10th February 2014].

Illeris, K. 2007. What Do We Actually Mean by Experiential Learning? *Human Resource Development Review* [online], 6(1). Available at: <http://hrd.sagepub.com/content/6/1/84.abstract> [Accessed: 10th February 2014].

Illeris, K. 2009a. A comprehensive understanding of human learning. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st ed. London: Routledge, pp. 7-20.

Illeris, K. ed. 2009b. *Contemporary theories of learning : learning theorists -- in their own words*. 1st ed. London: Routledge.

Illeris, K. 2011. *The fundamentals of workplace learning : understanding how people learn in working life*. 1st ed. London: Routledge.

IPCC. 2007. *Fourth Assessment Report: Climate Change 2007* [online], Geneva. IPCC. Available at: http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html [Accessed: 14th June 2014].

IPCC. 2013. *Climate Change 2013: The Physical Science Basis. Contribution of working Group 1 to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [online], Cambridge and New York. Cambridge University Press. Available at: http://www.climatechange2013.org/images/report/WG1AR5_Frontmatter_FINAL.pdf [Accessed: 9th February 2014].

ISE. 2015. *Code of conduct and guidance notes*. [online]. The Institution of Structural Engineers. Available at: <http://www.istructe.org/webtest/files/dd/dd7926b2-0487-4f20-a66c-c892fa670e11.pdf> [Accessed: 15th June 2015]

Jamison, A. 2001. *The making of green knowledge : environmental politics and cultural transformation*. Cambridge: Cambridge University Press.

- Jamison, A. 2010. In Search of Green Knowledge: A Cognitive Approach to Sustainable Development. In: Moore, S.A. ed. *Pragmatic Sustainability: theoretical and practical tools*. Abingdon: Routledge, pp. 68-80.
- Jaradat, S. and Whyte, J. and Luck, R. 2013. Professionalism in digitally mediated project work. *Building Research & Information* [online], 41(1). Available at: <http://dx.doi.org/10.1080/09613218.2013.743398> [Accessed: 3rd July 2014].
- Jarvis, P. 2009. Learning to be a person in society: learning to be me. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st ed. London: Routledge, pp. 21-34.
- Jarvis, P. 2010. *Adult education and lifelong learning: theory and practice*. 4th ed. Oxford: Routledge.
- Jarvis, P. 2012. *Adult learning in the social context*. 2nd ed. Abingdon: Routledge.
- Jha, A. 2010. Eco-bling and retrofitting won't meet emissions targets, warn engineers. *The Guardian* [online]. Available at: <http://www.theguardian.com/environment/2010/jan/20/eco-bling-retrofitting-carbon-emissions> [Accessed: 19th December 2014].
- Jones, D. K. 2001. Researching groups of lives: a collective biographical perspective on the Protestant ethic debate. *Qualitative Research* [online], 1(3). Available at: <http://qrj.sagepub.com/content/1/3/325.abstract> [Accessed: 2nd August 2011].
- Jones, P. and Pooley, A. and Tinning, B. 2012. Ecology, Critical Reflection and the Praxis of Change. In: Schwartz, M. and Lubell, C. and Gall, R. and Omer, A. eds. *A Future for Earth: Re-imagining Learning for a Transforming World: Proceedings of the 10th International Transformative Learning Conference*. San Francisco, 1-4 November, 2012. San Francisco: Meridian University, pp. 391-395.
- Kant, I. 1900. Kant on education : (ueber Padagogik). [e-book] Boston. D. C. Heath & Co. Publishers. Available at: http://if-oll.s3.amazonaws.com/titles/356/0235_Bk.pdf [Accessed: 24th March 2014].
- Kasl, E. and Elias, D. 2000. Creating New Habits of Mind in Small Groups. In: Mezirow, J. ed. *Learning as Transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco: Jossey-Bass Inc, pp. 229-252.
- Kegan, R. 1994. *In over our heads : the mental demands of modern life*. Cambridge, Mass. ; London: Harvard University Press.
- Kegan, R. 2000. What "form" transforms? A constructive-developmental approach to transformative learning. In: Mezirow, J. ed. *Learning as transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco: Jossey-Bass Inc, pp. 35-70.

Kegan, R. 2009. What "form" transforms? A constructive-developmental approach to transformative learning. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st. ed. London: Routledge, pp. 35-52.

Kegan, R. 2014. *The further reaches of adult development*. [video online]. RSA. Available at: <https://www.youtube.com/watch?v=BoasM4cCHBc> [Accessed: 15th July 2014]

Kegan, R. and Lahey, L. L. 2009. *Immunity to change : how to overcome it and unlock potential in yourself and your organization*. Boston: Harvard Business Press.

King, K. P. 2005. *Bringing transformative learning to life*. Original ed. Malabar: Krieger.

King, K. P. 2009. *The handbook of the evolving research of transformative learning : based on the learning activities survey*. 10th anniversary ed. Greenwich, Conn.: Information Age.

Knowles, M. S. 1984. *Andragogy in action*. San Francisco ; London: Jossey-Bass.

Kohlberg, L. and Levine, C. and Hower, A. 1983. *Moral stages : a current formulation and a response to critics*. Basel ; London: Karger.

Kolb, D. A. 1984. *Experiential learning : experience as the source of learning and development*. Englewood Cliffs ; London: Prentice-Hall.

Kolb, D. A. 1993. The process of experiential learning. In: Thorpe, M. and Edwards, R.J. and Hanson, A. eds. *Culture and processes of adult learning : a reader*. London: Routledge in association with the Open University, pp. 138-156.

Kovan, J. T. and Dirkx, J. M. 2003. "Being Called Awake": The Role Of Transformative Learning In The Lives Of Environmental Activists. *Adult Education Quarterly* [online], 53(2). Available at: <http://aeq.sagepub.com/cgi/content/abstract/53/2/99> [Accessed: 7th November 2007].

Krathwohl, D. R. and Bloom, B. S. and Masia, B. B. 1964. *Taxonomy of Educational Objectives The Classification of Educational Goals : Handbook II: Affective Domain*. S.I.: Longmans.

Kuhn, T. S. 1970. *The structure of scientific revolutions. Second edition, enlarged*. Chicago ; London: University of Chicago Press.

Kvale, S. and Brinkmann, S. 2009. *InterViews : learning the craft of qualitative research interviewing*. 2nd ed. Thousand Oaks ; London.: Sage Publications.

Lange, E. 2000. Beyond transformative learning: work, ethical space and adult education. In: Sork, T.J. and Chapman, V.-L. and Clair, R.S. eds. *Annual Adult Education Research Conference*. Vancouver, 2-4 June, 2000. Vancouver: University of British Columbia, pp. 230 - 234.

Lange, E. A. 2004. Transformative and restorative learning: A vital dialectic for sustainable societies. *Adult Education Quarterly* 54(2), p. 121.

Lange, E. A. 2009. Fostering a Learning Sanctuary for Transformation in Sustainability Education. In: Taylor, E.W. and Mezirow, J. eds. *Transformative learning in practice: insights from community, workplace, and higher education*. San Francisco: Jossey-Bass, pp. 193-204.

Langley, A. and Hopkinson, L. 2009. *Greening the commercial property sector: a guide for developing and implementing best practice through the UK leasing process* [online], Cardiff. CRiBE/WSA. Available at: <http://www.greenleases-uk.co.uk/Good%20Practise%20Guide%203-for%20web.pdf> [Accessed: 3rd May 2015].

Latour, B. and Yaneva, A. 2008. Give me a gun and I will make all buildings move: An ANT's view of architecture. *Explorations in architecture: Teaching, design, research* [online]. Available at: <http://peterahall.com/mapping/background/Latour-BUILDING-VENICE.pdf> [Accessed: 18th June 2015].

Lave, J. and Wenger, E. 1991. *Situated learning : legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lawson, B. 1997. *How designers think : the design process demystified*. Completely rev. 3rd ed. Oxford: Architectural Press.

Lawson, B. 2004. *What designers know*. Oxford: Architectural Press.

Leaman, A. and Bordass, B. 2001. Assessing building performance in use 4: the Probe occupant surveys and their implications. *Building Research & Information* [online], 29(2). Available at: <http://dx.doi.org/10.1080/09613210010008045> [Accessed: 30th October 2011].

Leaman, A. and Stevenson, F. and Bordass, B. 2010. Building evaluation: practice and principles. *Building Research & Information* [online], 38(5). Available at: <http://dx.doi.org/10.1080/09613218.2010.495217> [Accessed: 30th October 2011].

Leopold, A. S. [1949] 1968. *A sand county almanac, and sketches here and there; illustrated by Charles W. Schwartz*. London: Oxford University Press.

Light, A. 2010. A moral journey of environmentalism: from wilderness to place. In: Moore, S.A. ed. *Pragmatic Sustainability: theoretical and practical tools*. Abingdon: Routledge, pp. 136-148.

Low Carbon Routemap for the UK Built Environment. 2013. [online], London WRAP, The Climate Centre, ARUP. Available at: <http://www.greenconstructionboard.org/index.php/resources/routemap> [Accessed: 16th August 2016].

Lund-Thomsen, P. 2007. Corporate social responsibility: towards a new dialogue? In: Wals, A.E.J. ed. *Social learning towards a sustainable world : principles*,

perspectives and praxis. Netherlands: Wageningen Academic Publishers, pp. 297-311.

MacKay, D. J. C. 2009. *Sustainable energy - without the hot air*. Cambridge: UIT.

Maio, G. R. and Olson, J. M. and Allen, L. and Bernard, M. M. 2001. Addressing Discrepancies between Values and Behavior: The Motivating Effect of Reasons. *Journal of Experimental Social Psychology* [online], 37(2). Available at: <http://www.sciencedirect.com/science/article/pii/S0022103100914367> [Accessed: 20th May 2014].

Manzini, E. and Tassinari, V. 2013. Sustainable qualities. In: Crocker, R. and Lehmann, S. eds. *Motivating change : sustainable design and behaviour in the built environment*. Oxon: Routledge.

Manzo, L. and Devine-Wright, P. eds. 2014. *Place attachment : advances in theory, methods, and applications*. Oxford: Routledge.

Mark, L. 2013. *Part L: RIBA warns of 'uphill struggle to meet carbon commitments'*. Architects' Journal. 30th July 2013. [online]. Available at: <http://www.architectsjournal.co.uk/news/part-l-riba-warns-of-uphill-struggle-to-meet-carbon-commitments/8651501.article> [Accessed: 17th March 2014].

Marshall, C. and Rossman, G. B. 2006. *Designing qualitative research*. 4th ed. ed. London: SAGE.

Marshall, G. 2007. *Carbon detox : your step-by-step guide to getting real about climate change*. London: Gaia.

Marshall, G. 2014. *Don't even think about it : why our brains are wired to ignore climate change*. London: Bloomsbury.

Martin, C. J. and Taylor, P. G. and Upham, P. and Ghiasi, G. and Bale, C. S. E. and James, H. and Owen, A. and Gale, W. F. and Slack, R. J. and Helmer, S. 2014. Energy in low carbon cities and social learning: A process for defining priority research questions with UK stakeholders. *Sustainable Cities and Society* [online], 10. Available at: <http://www.sciencedirect.com/science/article/pii/S2210670713000516> [Accessed: 3rd February 2015].

Maslow, A. H. 1968. *Toward a psychology of being. Second edition*. 2nd ed. New York: Van Nostrand Reinhold.

Mason, J. 2009. Ethics in the construction industry: the prospects for a single professional code. *International Journal of Law in the Built Environment* [online], 1(3). Available at: <http://www.emeraldinsight.com/doi/abs/10.1108/17561450911001252> [Accessed: 3rd March 2015].

McDonald, B. and Cervero, R. M. and Courtenay, B. C. 1999. An ecological perspective of power in transformational learning: a case study of ethical vegans.

- Adult Education Quarterly* [online], 50(1). Available at:
<http://aeq.sagepub.com/cgi/content/abstract/50/1/5> [Accessed: 24th July 2007].
- Meadows, D. H. and Randers, J. and Meadows, D. L. and Meadows, D. H. 2005. *Limits to growth : the 30-year update*. London: Earthscan.
- Merleau-Ponty, M. [1945] 1962. *Phenomenology of perception*. London: Routledge & Kegan Paul, (1992 [printing]).
- Mezirow, J. 1991. *Transformative Dimensions of Adult Learning*. San Francisco: Jossey-Bass.
- Mezirow, J. ed. 2000a. *Learning as Transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco: Jossey-Bass.
- Mezirow, J. 2000b. Learning to Think Like an Adult: core concepts of transformation theory. In: Mezirow, J. ed. *Learning as Transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco, Calif.: Jossey-Bass Inc, pp. 3-34.
- Mezirow, J. 2009. Transformative learning theory. In: Taylor, E.W. and Mezirow, J. eds. *Transformative learning in practice: insights from community, workplace, and higher education*. San Francisco: Jossey-Bass, pp. 18-32.
- Monbiot, G. 2013. Nuclear scare stories are a gift to the truly lethal coal industry. *The Guardian*. 16th December 2013. [online]. Available at:
<http://www.theguardian.com/commentisfree/2013/dec/16/nuclear-scare-stories-coal-industry> [Accessed: 17th March 2014].
- Moon, J. A. 1999. *Reflection in learning & professional development : theory & practice*. London: Kogan Page.
- Moon, J. A. 2004. *A handbook of reflective and experiential learning : theory and practice*. London: RoutledgeFalmer.
- Moore, R. 2012. Definitions of fuel poverty: Implications for policy. *Energy Policy* [online], 49(0). Available at:
<http://www.sciencedirect.com/science/article/pii/S0301421512000833> [Accessed: 15th February 2014].
- Moore, S. A. 2010. Introduction. In: Moore, S.A. ed. *Pragmatic sustainability : theoretical and practical tools*. 1st ed. London: Routledge, pp. 1-12.
- Moustakas, C. 1994. *Phenomenological research methods*. Thousand Oaks, Calif. ; London: Sage.
- Murray, P. 2010. *Being sustainable in a business setting - how can values help?* [online], PP4SD and the IES. Available at:
http://www.pp4sd.org.uk/downloads/PP4SD_Values_Report.pdf [Accessed: 19th May 2014].

Murray, P. 2011. *The sustainable self : a personal approach to sustainability education*. London: Earthscan.

Murray, P. 2013. Leading by design: cultivating self-leadership for sustainability. In: Crocker, R. and Lehmann, S. eds. *Motivating change : sustainable design and behaviour in the built environment*. Oxon: Routledge, pp. 127-152.

Murray, P. E. and Murray, S. A. 2007. Promoting sustainability values within career-oriented degree programmes: A case study analysis. *International Journal of Sustainability in Higher Education* [online], 8(3). Available at: <http://www.emeraldinsight.com/Insight/viewContentItem.do?contentType=Article&contentId=1621386> [Accessed: 6th September 2007].

NHBC. n.d. *Air leakage services - frequently asked questions*. [online]. Available at: <http://www.nhbc.co.uk/Productsandservices/ConsultancyandTesting/Airleakageservices/FAQs/> [Accessed: 11th April 2015]

Nicol, F. and Roaf, S. 2005. Post-occupancy evaluation and field studies of thermal comfort. *Building Research & Information* [online], 33(4). Available at: <http://dx.doi.org/10.1080/09613210500161885> [Accessed: 4th July 2014].

Nobe, M. C. 2007. Values and Environmental Value Orientations of Construction Management Students. In: CEBE ed. *Built Environment Education Conference*. London, 12-13 September, 2007. Cardiff: CEBE, pp. 1-13.

Nolden, C. 2015. *Performance and impact of the feed-in tariff scheme : review of evidence* [online], Sussex University/DECC. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/456181/FIT_Evidence_Review.pdf [Accessed: 3rd May 2016].

O'Hara, M. 2003. Cultivating Consciousness: Carl R. Rogers's Person-Centered Group Process as Transformative Androgogy. *Journal of Transformative Education* 1(1), pp. 64-79.

O'Sullivan, E. 2003. Bringing a perspective of transformative learning to globalized consumption. *International Journal of Consumer Studies* [online], 27(4). Available at: <http://www.blackwell-synergy.com/doi/full/10.1046/j.1470-6431.2003.00327.x> [Accessed: 23rd July 2007].

O'Sullivan, E. 2008. Finding Our Way in the Great Work. *Journal of Transformative Education* [online], 6(1). Available at: <http://jtd.sagepub.com/content/6/1/27.abstract> [Accessed: 16th February 2014].

O'Sullivan, E. V. 1999. *Transformative learning : educational vision for the 21st century*. Toronto ; University of Toronto Press ; London: Zed Books.

Ochsner, J. K. 2000. Behind the Mask: A Psychoanalytic Perspective on Interaction in the Design Studio. *Journal of Architectural Education* [online], 53(4). Available at: <http://www.blackwell-synergy.com/doi/abs/10.1162/104648800564608> [Accessed: 12th May 2007].

Orr, D. 2007. *Architecture, ecological design, and human ecology*. Oxon: Routledge.

Orr, D. W. 2004. *Earth in mind : on education, environment, and the human prospect*. 10th anniversary ed. Washington, D.C.: Island.

Owen, A. and Mitchell, G. 2015. Outside influence – Some effects of retrofit installers and advisors on energy behaviours in households. *Indoor and Built Environment* [online], 24(7). Available at: <http://ibe.sagepub.com/content/24/7/925.abstract> [Accessed: 1st November 2015].

Pallasmaa, J. 2012. *The eyes of the skin : architecture and the senses*. 3rd ed. Chichester: Wiley-Academy.

Papanek, V. 1995. *The green imperative : ecology and ethics in design and architecture*. London: Thames and Hudson.

Part L 2013 changes. 2014. [online]. Available at: <http://www.planningportal.gov.uk/buildingregulations/approveddocuments/partl/changes> [Accessed: 19th February 2014]

Passivhaus Trust. 2014. [online]. Available at: <http://www.passivhaustrust.org.uk/> [Accessed: 14th June 2014]

Pelly, H. and Hartman, H. 2013. *Bordass and Leaman drive home the need for simple buildings*. Architects' Journal. 18th June 2013. [online]. Available at: <http://www.architectsjournal.co.uk/footprint/bordass-and-leaman-drive-home-the-need-for-simple-buildings/8649345.article> [Accessed: 22nd February 2015].

Pendlebury, J. and Hamza, N. and Sharr, A. 2014. Conservation values, conservation-planning and climate change. *disP - The Planning Review* [online], 50(3). Available at: <http://dx.doi.org/10.1080/02513625.2014.979042> [Accessed: 17th March 2015].

Piaget, J. 1971. *Biology and knowledge: an essay on the relations between organic regulations and cognitive processes*. (Translated by Beatrix Walsh.). Edinburgh: Edinburgh University Press.

Pooley, A. 2010. Valuing reflection in learning; uncovering a relationship between transformative learning and student choice. In: Perkins, H. ed. *Society for Research into Higher Education Annual Research Conference* Newport, Wales, 14-16 December, 2010. London: Routledge,

Pooley, A. 2011. Construction in Crisis: environmental responsibility and an industry ready for change. In: Alhadeff-Jones, M.K., A. ed. *Transformative learning in time of crisis: Individual and collective challenges: Proceedings of the 9th International Transformative Learning Conference*. Athens, 27-30 May, 2011. Athens: Hellenic Open University, pp. 237-243.

Pooley, A. 2015. Transforming practice: re-linking professional experience and the curriculum. *Local Economy* [online], 30(3). Available at:

<http://lec.sagepub.com/content/30/3/292.full.pdf?ijkey=MeREZzEScYgiUYL&keytype=finite> [Accessed: 14th April 2015].

Pooley, A. and Haglund, B. 2014. Spaces of Transformation: The Experience of Architecture Students. In: *Spaces of Transformation and Transformation of Space: XI International Transformative Learning Conference*. Teachers College, Columbia University, 23-26 October, 2014. New York: Columbia University, pp. 948-954.

Pooley, J. A. and O'Connor, M. 2000. Environmental Education and Attitudes: Emotions and Beliefs are What is Needed. *Environment and Behavior* [online], 32(5). Available at: <http://eab.sagepub.com/cgi/content/abstract/32/5/711> [Accessed: 10th April 2007].

Poon, J. and Hoxley, M. 2010. Use of moral theory to analyse the ethical codes of built environment professional organisations: A case study of the Royal Institution of Chartered Surveyors. *International Journal of Law in the Built Environment* [online], 2(3). Available at: <http://dro.deakin.edu.au/eserv/DU:30048708/poon-useofmoral-2010-post.pdf> [Accessed: 19th May 2014].

PP4SD. 2000. *Professional Practice for Sustainable Development Book 2: Developing cross-professional learning opportunities and tools* [online], WWF-UK. Institute of Environmental Science. Available at: <http://www.pp4sd.org.uk/downloads/pdf/Book2.pdf> [Accessed: 19th May 2014].

Pultar, M. 2000. The conceptual basis of building ethics. In: Fox, W. ed. *Ethics and the built environment*. London ; New York: Routledge, pp. 155-169.

RIBA. 2005. *RIBA code of professional conduct*. [online]. Royal Institute of British Architects. Available at: <https://www.architecture.com/Files/RIBAProfessionalServices/ProfessionalConduct/DisputeResolution/ProfessionalConduct/RIBACodeOfProfessionalConduct.pdf> [Accessed: 18th August 2016]

Robinson, G. M. and Guilbert, S. and Tudor, T. and Barr, S. W. and Metcalf, A. and Riley, M. 2013. Ethnicity, environmental behaviour and environmental justice: initial findings from research in a London borough. In: Crocker, R. and Lehmann, S. eds. *Motivating change : sustainable design and behaviour in the built environment*. Oxon: Routledge.

Rogers, C. 1993. The interpersonal relationship in the facilitation of learning. In: Thorpe, M. and Edwards, R.J. and Hanson, A. eds. *Culture and processes of adult learning : a reader*. London: Routledge in association with the Open University, pp. 228-242.

Roszak, T. 1993. *The voice of the earth*. London: Bantam.

Schapiro, S. A. 2009. A crucible for transformation: the alchemy of student-centered education for adults at midlife. In: Fisher-Yoshida, B. and Geller, K.D. and Schapiro, S.A. eds. *Innovations in transformative learning : space, culture, & the arts*. New York ; Oxford: Peter Lang, pp. 87-109.

Schmuck, P. and Schultz, P. W. 2002. Sustainable development as a challenge for psychology. In: Schmuck, P. and Schultz, P.W. eds. *Psychology of sustainable development*. Boston, Mass.: Kluwer Academic Publisher, pp. 3-18.

Schön, D. A. 1991. *The reflective practitioner : how professionals think in action*. Aldershot: Avebury.

Schultz, P. W. and Gouveia, V. V. and Cameron, L. D. and Tankha, G. and Schmuck, P. and Franěk, M. 2005. Values and their Relationship to Environmental Concern and Conservation Behavior. *Journal of Cross-Cultural Psychology* [online], 36(4). Available at: <http://jcc.sagepub.com/content/36/4/457.abstract> [Accessed: 1st July 2012].

Schultz, P. W. and Zelezny, L. 1999. Values as predictors of environmental attitudes: evidence for consistency across 14 countries. *Journal of Environmental Psychology* [online], 19(3). Available at: <http://www.sciencedirect.com/science/article/pii/S0272494499901299> [Accessed: 2nd May 2015].

Schumacher, E. F. [1973] 1989. *Small is beautiful : a study of economics as if people mattered*. London: Abacus.

Seamon, D. 1977. *Movement, rest, and encounter: a phenomenology of everyday environmental experience*. PhD Thesis, Clark University.

Seamon, D. 2000. Phenomenology, place, environment, and architecture: a review. *Environmental & architectural phenomenology* [online], Environmental & architectural phenomenology newsletter. Available at: http://www.arch.ksu.edu/seamon/Seamon_reviewEAP.htm [Accessed: 12th December 2014].

Seamon, D. 2014. Place attachment and phenomenology: the synergistic dynamism of place. In: Manzo, L. and Devine-Wright, P. eds. *Place attachment : advances in theory, methods, and applications*. Oxford: Routledge, pp. 11-22.

Selby, D. 2002. The signature of the whole: radical interconnectedness and its implications for global and environmental education. In: O'Sullivan, E.V. and Morrell, A. and O'Connor, M.A. eds. *Expanding the boundaries of transformative learning : essays on theory and praxis*. Basingstoke: Palgrave, pp. 77-93.

Singer, P. 2011. Practical ethics. [e-book] Cambridge. Cambridge University Press. Available at: <https://www.dawsonera.com/readonline/9781139038362/startPage/254> [Accessed: 25th June 2014].

Smith, J. A. 2010. Evaluating the contribution of interpretative phenomenological analysis. *Health Psychology Review* [online], 5(1). Available at: <http://dx.doi.org/10.1080/17437199.2010.510659> [Accessed: 10th February 2014].

Spector, T. 2001. *The ethical architect : the dilemma of contemporary practice*. New York: Princeton Architectural Press.

Sterling, S. 2009. Ecological intelligence : viewing the world relationally. In: Stibbe, A. ed. *The handbook of sustainability literacy : skills for a changing world*. Totnes: Green, p. 220 p.

Sterling, S. 2012. *The future fit framework: an introductory guide to teaching and learning for sustainability in HE* [online], Plymouth Centre for Sustainable Futures, Plymouth University/HEA. Available at: http://www.heacademy.ac.uk/assets/documents/esd/Future_Fit_270412_1435.pdf [Accessed: 14th June 2014].

Stern, N. 2006. *The economics of climate change* [online], Norwich. TSO (The Stationery Office). Available at: http://webarchive.nationalarchives.gov.uk/20130129110402/http://www.hm-treasury.gov.uk/stern_review_report.htm [Accessed: 19th May 2014].

Stevenson, J. 2013. *Analysing narratives through Bourdieurian lens*. to: Pooley, A. Received 29th May 2013.

Taylor, E. W. 2000. Analyzing research on transformative learning theory. In: Mezirow, J. ed. *Learning as transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco, Calif.: Jossey-Bass Inc, pp. 285-328.

Taylor, E. W. 2007. An update of transformative learning theory: a critical review of the empirical research (1999-2005). *International Journal of Lifelong Education* [online], 26(2). Available at: <http://search.ebscohost.com/login.aspx?direct=true&db=ehh&AN=24904747&site=ehost-live> [Accessed: 11th May 2010].

Teddlie, C. and Tashakkori, A. 2013. Mixed methods research : contemporary issues in an emerging field. In: Denzin, N.K. and Lincoln, Y.S. eds. *Strategies of qualitative inquiry*. Fourth Edition. ed. London: Sage, pp. 135-167.

Tilbury, D. 2007. Learning based change for sustainability: perspectives and pathways. In: Wals, A.E.J. ed. *Social learning towards a sustainable world : principles, perspectives and praxis*. Netherlands: Wageningen Academic Publishers, pp. 117-132.

Till, J. 2007. Three myths and one model. *Jeremy Till Collected Writings* [online]. Available at: https://jeremytill.s3.amazonaws.com/uploads/post/attachment/34/2007_Three_Myths_and_One_Model.pdf [Accessed: 19th May 2014].

Till, J. 2009. *Architecture depends*. Cambridge, Mass.: MIT.

Till, J. 2012. Scarcity contra Austerity. *The Design Observer Group* [online]. Available at: <http://places.designobserver.com/feature/scarcity-contra-austerity/35638/> [Accessed: 19th May 2014].

Tofield, B. 2012. *Delivering a low-energy building : making quality commonplace* [online], Build with CaRe: University of East Anglia. Available at: http://www.northsearegion.eu/files/repository/20140331180312_BuildwithCaReResearchReport-DeliveringaLow-EnergyBuildingOct2012.pdf [Accessed: 3rd July 2014].

- Transition Network. 2013. [online]. Available at: <http://www.transitionnetwork.org/initiatives/by-number> [Accessed: 14th June 2014]
- TSB. 2014. *Retrofit analysis*. [online]. Available at: <https://retrofit.innovateuk.org/> [Accessed: 17th June 2014]
- UN. 2014. *Climate Summit 2014*. [online]. Available at: <http://www.un.org/climatechange/summit2014/> [Accessed: 17th June 2014]
- UNDESA. 2015. *World urbanisation prospects : the 2014 revision* [online], New York. The United Nations Department of Economic and Social Affairs, Population Division. Available at: <https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Report.pdf> [Accessed: 16th August 2016].
- UNEP. 2009. *Buildings and climate change : summary for decision-makers* [online], Paris. The United Nations Environment Programme. Available at: <http://www.unep.org/SBCI/pdfs/SBCI-BCCSummary.pdf> [Accessed: 11th February 2014].
- UNESCO. 2005. *Education for sustainable development (ESD)*. [online]. Available at: <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/> [Accessed: 1st November 2010]
- UNESCO. 2010. *Education for sustainable development in the UK in 2010*. [online]. Available at: http://www.unesco.org.uk/education_for_sustainable_development [Accessed: 20th May 2014]
- UNFCCC. 2014a. *Copenhagen Climate Change Conference - December 2009*. [online]. Available at: http://unfccc.int/meetings/copenhagen_dec_2009/meeting/6295.php [Accessed: 15th February 2014]
- UNFCCC. 2014b. *Kyoto Protocol*. [online]. Available at: http://unfccc.int/kyoto_protocol/items/2830.php [Accessed: 14th March 2014]
- UNFCCC. 2015. *The Paris Agreement*. [online]. Available at: http://unfccc.int/paris_agreement/items/9485.php [Accessed: 10th September 2016]
- Urban, F. and Nordensvärd, J. eds. 2013. *Low carbon development : key issues*. London: Earthscan.
- Vale, B. and Vale, R. J. D. 2013. The Hockerton Housing Project, England. In: Vale, B. and Vale, R.J.D. eds. *Living within a fair share ecological footprint*. Oxford: Routledge, pp. 262-274.
- Walker, S. 2014. *Designing sustainability: making radical changes in a material world*. Oxford: Routledge.

- Wals, A. E. J. and van der Leij, T. 2007. Introduction. In: Wals, A.E.J. ed. *Social learning towards a sustainable world : principles, perspectives and praxis*. Netherlands: Wageningen Academic Publishers, pp. 17-32.
- Wamsler, C. 2014. *Cities, Disaster Risk and Adaptation*. London: Routledge.
- Ward, K. 2013. *Trainees' reflections on developing personal and professional skills through managing risk*. PhD Thesis, Cardiff University.
- Way, M. and Bunn, R. 2009. *The Soft Landings Framework* [online], UBT/BSRIA. Available at: <http://usablebuildings.co.uk/UBTOverflow/SoftLandingsFramework.pdf> [Accessed: 18th June 2014].
- WCED. 1987. *Our Common Future* [online], World Commission on Environment and Development. United Nations. Available at: <http://www.un-documents.net/our-common-future.pdf> [Accessed: 19th May 2014].
- Wenger, E. 1999. *Communities of practice : learning, meaning, and identity*. Cambridge: Cambridge University Press.
- Wenger, E. 2009a. Social learning capability: Four essays on innovation and learning in social systems. [online]. Available at: <http://wenger-trayner.com/wp-content/uploads/2011/12/09-04-17-Social-learning-capability-v2.1.pdf> [Accessed: 19th May 2014].
- Wenger, E. 2009b. A social theory of learning. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st. ed. London: Routledge, pp. 209-218.
- Wenger, E. and Trayner, B. and de Laat, M. 2011. *Promoting and assessing value creation in communities and networks: a conceptual framework* [online], Open Universiteit Nederland. Ruud de Moor Centrum. Available at: http://wenger-trayner.com/wp-content/uploads/2011/12/11-04-Wenger_Trainer_DeLaat_Value_creation.pdf [Accessed: 19th May 2014].
- Weston, B. H. and Bollier, D. 2013. Toward a recalibrated human right to a clean and healthy environment: making the conceptual transition. *Journal of Human Rights and the Environment* [online], 4(2). Available at: <http://www.elgaronline.com/journals/jhre/4-2/jhre.2013.02.01.xml> [Accessed: 10th February 2014].
- Wildemeersch, D. and Stroobants, V. 2009. Transitional learning and reflexive facilitation: the case of learning for work. In: Illeris, K. ed. *Contemporary theories of learning : learning theorists -- in their own words*. 1st. ed. London: Routledge, pp. 219-232.
- Woolley, T. 2013. *Low impact building: housing with renewable materials*. Chichester, West Sussex, UK: Wiley-Blackwell.

Yorks, L. and Marsick, V. J. 2000. Organizational Learning and Transformation. In: Mezirow, J. ed. *Learning as Transformation : critical perspectives on a theory in progress*. 1st ed. San Francisco, Calif.: Jossey-Bass Inc, pp. 253-284.

Zapata-Lancaster, G. 2014. *An investigation of the tools and situated learning in non-domestic low carbon building design*. PhD Thesis, Cardiff University.

Zapata-Poveda, G. ed. 2012. *Detailed design ethnography: architects embedding low carbon performance* [online]. 28th Annual Conference Association of Researchers in Construction Management. Edinburgh. Available at: http://www.arcom.ac.uk/-docs/proceedings/ar2012-1367-1377_Zapata-Poveda.pdf [Accessed: 20th May 2014].

Zero Carbon Policy. 2014. [online]. Zero Carbon Hub. Available at: <http://www.zerocarbonhub.org/zero-carbon-policy/zero-carbon-policy> [Accessed: 19th May 2014]

Appendix A: Participant information

PHASE ONE INTERVIEWS:			
interview number:	Profession:	interview:	Project:
1	Architect	face to face	PROJECT 1 : House
2	Contractor/builder	face to face	PROJECT 1 : House
	Contractor/engineer		PROJECT 1 : House
6	Architect/senior	face to face	PROJECT 2 : Secondary School – semi-rural
	Architect/project		PROJECT 2 : Secondary School – semi-rural
	Architect/landscape		PROJECT 2 : Secondary School – semi-rural
	Architect/researcher		PROJECT 2 : Secondary School – semi-rural
	Architect/assistant		PROJECT 2 : Secondary School – semi-rural
	Researcher		PROJECT 2 : Secondary School – semi-rural
	Architect/experienced		PROJECT 2 : Secondary School – semi-rural
14	Client	telephone	PROJECT 2 : Secondary School – semi-rural
8	Engineer/services	face to face	PROJECT 2 : Secondary School – semi-rural
	Engineer/structural		PROJECT 2 : Secondary School – semi-rural
5	Architect/senior	face to face	PROJECT 3 : Secondary School – urban
13	Architect/project	face to face	PROJECT 3 : Secondary School – urban
7	Engineer	face to face	PROJECT 3 : Secondary School – urban
18	Contractor/site	face to face	PROJECT 3 : Secondary School – urban
	Contractor/design		PROJECT 3 : Secondary School – urban
17	Engineer	face to face	PROJECT 4 : Commercial
16	Client/developer	face to face	PROJECT 4 : Commercial
19	Client/agent	face to face	PROJECT 4 : Commercial
15	Architect	face to face	PROJECT 4 : Commercial
SCOPING INTERVIEWS:			
3	Architect/senior	face to face	SCOPING 1 : Social Housing -urban
3	Architect		SCOPING 1 : Social Housing -urban
3	Architect/project		SCOPING 1 : Social Housing -urban
10	Architect/project	face to face	SCOPING 1 : Social Housing -urban
9	Architect	face to face	SCOPING 2 : Social Housing – semi-rural
4	Architect	face to face	SCOPING 3 : Sports Centre
12	Architect	face to face	SCOPING 4 : Primary School
PHASE TWO INTERVIEWS:			
22	Architect – Arthur	telephone	PROJECT 1 : House
20	Engineer – Enzo	telephone	PROJECT 2 : Secondary School – semi-rural
21	Contractor – Colin	telephone	PROJECT 3 : Secondary School – urban
23	Client – Clive	telephone	PROJECT 4 : Commercial

Appendix B: Interview summary sheets

Research interview summary – no. 1 & 22

Participant: Architect
Age: 35-45
Profession: Architect
Project: Project 1 - House
Interview date: 7 June 2010 & 25 April 2014

Interview Summary

Participant:

Partner in small practice (less than 5 employees). Also has a part time teaching role.

Project:

Very challenging small project, refurbishment of an existing house to very high environmental standard, a unique project at the time of completion that has since been overtaken (or at least caught up with) by other single house refurbishment projects.

Learning:

Lots of learning, reflects on own learning within formal education and whilst in the profession, is able to highlight significant experiences that informed current position and desire to take on this challenging project. Emphasises the importance of communication across disciplines and multi-disciplinary working/understanding.

Profession:

Comments on state of profession and knowledge within the profession around environmental strategies for building – especially concerning issues of air tightness and materials specification. Some comments about inadequacy of assessment methods and lack of understanding of wider context within the profession. Commercial pressures and importance of having a willing client (willing to invest additional money). Importance of legislation in changing the profession quickly.

Interview:

This was my first interview for this research, and I ramble on at the beginning trying to explain my PhD and I talk too much through the whole interview. This was corrected with later interviews – but I still think it is worth using this project rather than consigning it to a scoping interview as there is a lot that comes out of this interview and with the contractors.

Other comments:

Second interview via phone, personal and professional circumstances changed from 4 years ago, practice concentrating on one element of environmental design and focusing on existing buildings, practice remains a similar size. Emphasis on how little has changed really despite legislation; construction is the last dinosaur.

Research interview summary – no. 2

Participant: Contractor/engineer and Contractor/builder
Age: 35-45 and 55-65
Profession: Contractors
Project: Project 1 - House
Interview date: 24 June 2010

Interview Summary

Participant:

Joint interview with contractor and services engineer. Both had various background and vicarious route to current professions within the construction industry. Builder undergraduate degree as civil engineer then worked on site and gradually project managed. Engineer began career as mechanic and then migrated over to construction. Both have varied interests outside of the profession that fuel their enthusiasm for construction.

Project:

A challenge, complicated, expensive and time consuming. Difficulties that were overcome and issues with architect and method of construction versus business as usual and standard detailing.

Learning:

A lot of learning took place, mainly through the internet and looking things up on-line whilst on site. Importance of construction detailing – also comment on wider profession and learning, lack of apprenticeships/training and how legislation and economic incentives have to kick in before things will change within the profession.

Profession:

See above comments, wider context for learning within the profession, commercial decisions, incentives and disincentives – taxation and change. Lack of learning and slow moving profession, no agenda within the construction industry for rapid change.

Interview:

This was a very interesting interview which unfortunately was conducted in a pub so has a lot of background noise. Very difficult to transcribe but worth it. Over an hour long as it was more of a conversation between the two with me having to guide it back to my own agenda every so often.

Other comments:

Have three interviews in total for this project – would like to interview the client although this may be overloading the number of interviews? Only a small project and the 3 interviews conducted were main team.

Research interview summary - no. 3

Participants: Group interview with three architects
Age: 25-55
Profession: Architects
Project: Scoping project 1 – social housing
Interview date: 24 June 2010

Interview Summary

Participant:

Group interview with 3 architects from the same practice experienced in social housing and community engagement.

Project:

Social housing scheme in south east; eco homes rating. Comments on the difficulties with planning and how that changed the scheme and inhibited some of the environmental measures. Planning and budget constraints reduced the assessment rating by one level.

Learning:

The practice is very focused on sharing of knowledge, recognises that this isn't always possible within the practice and certainly not within the industry as a whole. Learning on this project was limited although did learn lessons for the future around processes and communication rather than outcomes. References to previous and subsequent projects where learning has been evident and has impacted on contractors and their practice. Mainly to do with specification of materials.

Profession:

Not all of the profession is willing to share knowledge; or admit to not knowing something, this is perceived as inhibiting further learning and sharing of good practice. Comments on the planning system and how this can inhibit creative solutions, need for planning to be aware that there is a relationship between form and function.

Interview:

Background noise, planes and other things – one participant very softly spoken so difficult to pick up on those sections. Useful discussion – welcomed opportunity to reflect and would like to embed this in their own practice.

Other comments:

Went on to interview one of the participants further as part of scoping process, would like to interview contractor but no luck to date – although has agreed. Could then use these interviews as main project interviews rather than scoping. Contractor and others were unable to participate in research; so not taken forward.

Research interview summary – no. 4

Participant: Architect
Age: 35-45
Profession: Architect
Project: Scoping project 3 – Sports Centre
Interview date: 08/07/10

Interview Summary

Participant:

Director of a medium sized practice (between 10-20 employees).

Project:

New facility for higher education institution with BREEAM excellent.

Learning:

Reflected on own learning generally through undergraduate to professional practice and how that has effected current practice. Discussed the learning within the profession and how that impacts on future projects some good examples of dissemination of good practice and contractors taking on innovative solutions from one project to the next. Learning within the profession generally and inadequacies of some assessment methods. Importance of doing the numbers.

Profession:

Comments on wider profession, see above and how innovation on one project can impact others. Environmental solutions can simplify construction and help resolve complicated issues, this is a good learning opportunity and one the contractors respond to. Importance of communicating ideas and design intent behind building to end users – how to use this building.

Interview:

Appreciated the opportunity to reflect (as nearly everyone did especially the architects) lots of useful comments and own route through, the issue of wanting to make things better came up several time.

Other comments:

Useful interview although leave it as a scoping interview rather than attempt to interview the wider team. Many similarities to interview no10 in background, route to architecture and professional ambition.

Research interview summary – no. 5

Participant: Architect/senior
Age: 45-55
Profession: Architect
Project: Project 3 - School - urban
Interview date: 31 August 2010

Interview Summary

Participant:

One of the directors of practice.

Project:

Secondary school benefiting from funding through pathfinder scheme, additional funding secured through commitment to lower CO2 by 60%. Rebuild of new school then demolition of existing. D&B contract.

Learning:

Comments on own learning and that of the practice, involved in initial development of the project then handed over to a more junior member of staff as project architect. Some aspects of job were more successful than others, difficulties with funding and compromise (including value engineering). Comments on learning broaden out to include comments regarding using the building as a tool to educate. Compromise and appropriateness.

Profession:

Profession catching up and on top of the environmental issues, differences in practice and ambitions between practices. Focused on architecture rather than the profession as a whole. Some large contractors have just 'got it' as it makes commercial sense, small contractor more likely to be on board – medium sized contractors getting left behind? Importance of having services engineers on board very early in project, architects can no longer take something to planning and then get the rest of the team together. Emphasising the importance of the team approach. Comments on values within own practice and architecture generally.

Interview:

Bit of background noise on occasion (traffic and planes) a lot of project information at start of interview to set the scene.

Other comments:

Also interviewed the project architect so this interview could become a scoping interview – although project information useful so are comments on the profession in general.

Research interview summary - no. 6

Participant: Group interview with architects, landscape architect and
researchers
Age: 25-55
Profession: Architects
Project: Project 2 – School - semi-rural
Interview date: 01/09/10

Interview Summary

Participants:

Group of architects who worked on the project.

Project:

Secondary school for local authority. BREEAM very good.

Learning:

Project was approached on a very holistic basis so learning was intended to go beyond the professionals involved and building and process of construction used as a learning tool for the end users and the wider community. Emphasised the importance placed on learning and research within the practice; and the building as a learning tool. A lot of discussion about risk and support from the practice.

Profession:

Profession slow to change, as others mentioned. Importance of research and dissemination and funding this work through projects, needs to be properly allocated a budget. This would also include post occupancy. Not particularly interested in the wider aspects of assessment and what they viewed as tick box exercises – keen to address all aspects of sustainability, not neglect the social, this ethos spreads throughout the office.

Interview:

Useful interview – also filmed to help identify the participants and when they are speaking, video volume a bit low.

Other comments:

Director of practice was present and might be useful to pull those comments out and code separately. Led on to individual interview with one member of staff, might need to do one further interview with project architect. Useful to note – this was only group interview in a practice that places cooperation, group cohesion and community very highly on list of values.

Research interview summary – no. 7

Participant: Engineer
Age: 35-45
Profession: Co-ordinating engineer
Project: Project 3 - School - urban
Interview date: 1 September 2010

Interview Summary

Participant:

Came up through the tools, engineer by profession, for this project was co-ordinator of a multi disciplinary team and had a key role in delivery of services and structural aspects.

Project:

Comments on details of project, commercial decisions and conceived areas where value for money was compromised or could have been maximised. As headed up multi disciplinary team from an engineering aspect has a good overall concept of successes of project. Focused on technical rather than value or reflection on own role.

Learning:

Again focused on the technical aspects – where knowledge was developed or conventional practice challenged, those comments are useful. Talks about assessment methods and inadequacy of them (in particular BREEAM).

Profession:

Comments made on wider profession in respect of assessment and legislation.

Interview:

A very long interview (an hour and a half) with a lot of emphasis on technical issues relating to the project, rather than reflection, despite my attempts to engage with this. A lot of very useful and interesting technical detail which has to be sifted for the more buried aspects of reflection and comments on values within the profession and own working practices.

Other comments:

This interview went on far too long (difficult to contain the enthusiasm of interviewee) – still useful though as has a very pragmatic approach to the industry that does come through.

Research interview summary – no. 8 & 20

Participant: Engineer/mechanical & Engineer/structural
Age: 35-35
Profession: Engineers
Project: Project 2 – School - semi-rural
Interview date: 2 September 2010 & 9 April 2014

Interview Summary

Participant:

Joint interview with services engineer and structural engineer from the project team.

Project:

Commented on the usefulness of the approach the architects took, a holistic approach where everyone was working towards the same goal.

Learning:

Commented more on general issues around learning, and reflecting back on their own formal education, both had come through conventional routes to the profession through under-graduate study.

Profession:

Lots to say about the profession in general, learning within the profession, attitudes to environmental issues both personally and within their practices. Exploration into assessment and usefulness or otherwise of some of the assessment processes.

Interview:

Joint interview, quiet place easily distinguish between voices, lots of reflection, more of a conversation, I don't intervene much to keep them on track.

Other comments:

Useful to have this input from engineers – get a wider view of the project, 4 participants in this project overview.

Second interview was with engineer/services only. Personal circumstances have changed, comments on the direction of the industry, optimistic but war weary.

Research interview summary – no. 9

Participant: Architect
Age: 55-65
Profession: Architect
Project: Scoping project 2 – Social Housing
Interview date: 14 September 2010

Interview Summary

Participant:

Partner in small practice with many years experience in environmental architecture.

Project:

Social housing scheme, very controversial with local residents and difficulties getting through planning. Planners identified as ones who stall or halt completely innovation in form and material use which could have positive impacts, environmentally and socially.

Learning:

This was much more reflective; own learning still developing but main comments were about how others need to learn and get up to speed with some of the issues around building with a more environmental emphasis. Planning education came in for particular attention. Own education was singled out as being significant and for highlighting the importance of environmental considerations (undergraduate during tail end of first wave environmentalism).

Profession:

Comments on the profession, in particular planning and contractors not understanding motivation behind design, or not being willing to understand, or not being able to understand.

Interview:

Interesting and focused on very particular issues, not always completely on track but some useful comments and observations come through. The other partner (in this two partner practice) chipped in now and then so wonder how relaxed interviewee was as we were being overheard?

Other comments:

This could also make a useful case study project, but by the time I did this interview was already under-way with other projects which might be more significant. They were keen for me to interview planners – more for their own interest perhaps? Could interview planner and contractor?

Research interview summary – no. 10

Participant: Architect/project
Age: 25-35
Profession: Architect
Project: Scoping project 1 – Social Housing
Interview date: 5 October 2010

Interview Summary

Participant:

Project architect, traditional route through education. Talked quite a lot around motivation for becoming an architect, this interview was as a result of the group interview in June around the same project.

Project:

Focus on the project was limited, discussion around other projects and previous practice and how that had led to current position on architecture.

Learning:

Project was a useful learning experience, some on site experience, the value of discussion debate and sharing good practice – also the importance of disseminating this to contractors but most importantly end users. The important role of bodies such as AECB.

Profession:

Comments on 'bling' aspects of some architecture and how they have moved away from that aspect of the profession wanting to engage with social aspects of practice – strong theme of 'wanting to make things better'.

Interview:

Useful – initially wanted to use as a main project interview – other professions never got back and too many to analyse.

Other comments:

Could form part of a main project group of interviews. Have got agreement in principle from contractor.

Research interview summary – no.12

Participant: Architect
Age: 25-35
Profession: Architect
Project: Scoping project 4 – Primary School
Interview date: 07/10/10

Interview Summary

Participant:

Project architect for a primary school in south west – wanted to interview this participant following the group interview – at the time this interview was conducted I had envisaged that both projects would be used, so this participant comments little on project 2 and is more focused on the primary school. This participant comes from an arts background as a sculptor and that was of interest in the issues around learning and routes to learning.

Project:

Primary school, innovative construction method.

Learning:

First project as project architect, so big learning curve. Innovative construction method and learning process for the wider community involved in getting the primary school built.

Profession:

Comments on the profession, how came to architecture and observations generally about the direction architectural education needs to go in order to change.

Interview:

Bit noisy – in a café so background noise a bit of an issue. Useful supporting interview for the overview of the practice.

Other comments:

This interview was only marginally useful – interesting regarding background and route through to architecture, some useful comments on education process, perhaps for later.

Research interview summary – no. 13

Participant: Architect/project
Age: 25-35
Profession: Architect
Project: Project 3 - School - urban
Interview date: 7 October 2010

Interview Summary

Participant:

Project architect, first major project undertaken as project architect.

Project:

Commented on the complexity of the project and the difficulty of maintaining some of the environmental aspects of the design. Working with services engineers and contractors, some material use issues that pushed through and delayed the job. Some technological aspects of the project value engineered out of the final design.

Learning:

Learning curve, commented on confidence in pushing through your ideas especially when dealing with more experienced team members and contractors, the importance of information and communicating those ideas, which is harder to do if you are less confident in your own knowledge. Transformative experience when stayed at an 'eco' B&B – this radically changed their (life) partner's thinking and hence impacted on own life and priorities. Partner has since changed career in a more environmentally focused direction.

Profession:

Comments on professional development, working in teams and communication being the key to getting others 'on-board'.

Interview:

Hour long interview, quite a lot of technical detail about the project rather than reflection on learning and role and profession.

Other comments:

Interview with director of practice that supports this interview.

Research interview summary – no. 14

Participant: Client
Age: 45-55
Profession: Procurement – local authority
Project: Project 2 – School - semi-rural
Interview
date: 13 October 2010

Interview Summary

Participant:

On client side working for the local authority, background in construction and project management came up through the 'tools'.

Project:

Comments on procurement issues and ambitions of the LEA in procuring an environmental project. Sees the emphasis very much on the client to write the correct brief and be clear about what they want to get out of the building project, viewed the building as a learning tool.

Learning:

As above, learning was very much embedded in the ambition of this project – from engaging the wider community in the process, monitoring site waste and recycling etc. Taken further than needed to and able to do this because of the local authority remit.

Profession:

Understood the profession as worked on 'both sides of the fence'. Comments on lack of training and demise of apprenticeships – dissemination of good practice is key to training and legislation has to play a role beyond box ticking assessment processes.

Interview:

Conducted over the phone so volume a bit low – this was a rather cobbled together solution but it seemed to work OK; and is fine for transcription. As it was a telephone interview it is shorter than others – only just over half an hour – but perhaps more focused as a result?

Other comments:

Useful comments and good to get another client interview.

Research interview summary – no. 15

Participant: Architect
Age: 35-45
Profession: Architect
Project: Project 4 - Commercial
Interview date: 10 January 2011

Interview Summary

Participant:

Traditional route through architectural education although never really wanted to be an architect, just happened to be something that he picked. Had doubts about continuing architectural education post part 2 but did it anyway and now project architect for large commercial buildings. First project as project architect for this building type.

Project:

Challenging and a huge learning curve. Very different to dealing with projects of a smaller size or different building type. A lot of innovations and developments in conjunction with and support by engineers. Still very proud of the project and looks back on it fondly. Commented on the commercial success of the project (it was let before completion and sold, very profitably, twice during construction).

Learning:

Steep learning curve, rewarding and hard work. Team learning and sharing of information a feature of the project. Innovations taken forward to subsequent projects where commercial pressures allow. Some aspects further developed. Published project and delivered presentations to industry on aspects of innovation and material use.

Profession:

Comments on the profession as a whole (construction in general). Aspects of regulation and how to change practice, commercial pressures and legislation playing their role. Limits of CPD.

Interview:

Good interview, clear and focused.

Other comments:

Useful interview and very matter of fact about the process and the challenges; reflective and commented on enjoying the opportunity to reflect on the work and the project.

Research interview summary – no. 16

Participant: Client
Age: 45-55
Profession: Developer
Project: Project 4 - Commercial
Interview
date: 11 January 2010

Interview Summary

Participant:

Working for a major property developer. Background in construction, came up through site and project management to current position. Role on the project was as client, lead role.

Project:

Commented on contractor and success of the project, has since talked a lot about the project and still very proud of it in a commercial sense. Widely published.

Learning:

Comments on taking the learning onto other projects. Identifies learning opportunities within this project and that this hasn't necessarily been adopted by other projects as commercial pressure have inhibited this; or the market won't allow for innovation.

Profession:

The importance of cooperative working and the level of commitment to the innovations throughout the project from the whole team rather than just the client/architect/contractor. Sense of community within the team; all working towards the same goal without a culture of blame. Importance of having a contractor on-board early on in the project – that 'got it'.

Interview:

Very clear and focused, went well although does drift off a little towards the end (as most of them seem to do) – perhaps this is generally a signal that they have said everything they want to say on the subject?

Other comments:

Very useful to talk to the client, this is only the second client interview conducted and perhaps there is an argument that these are the key figures in project development and hence learning opportunities or the wider team.

Research interview summary – no. 17

Participant: Engineer
Age: 35-45
Profession: Services engineer
Project: Project 4 - Commercial
Interview date: 13 January 2011

Interview Summary

Participant:

Services engineer at a major inter-disciplinary practice. Straight career path from school through professional practice.

Project:

Large commercial project, developer led, in south east. Some interesting and pioneering innovations in the form of structure and servicing. A good contractor on board early on in project and led by developers willingness to invest in new techniques rather than technologies.

Learning:

After interview had finished mentioned mid career MSc that had confirmed own thoughts about environmental issues within construction and given more confidence in future direction, unfortunately this does not appear on the recording as device had been turned off by then. References made to university and learning at undergraduate level.

Profession:

Comments on the profession as a whole and in particular the importance of early integrated working from the start of a project.

Interview:

Shorter than most interviews (just over half an hour) and rather difficult, kept referring to wanting to give the 'right' answer. Constant reassurance from me that there was no such thing and this was about experience and opinion nothing more.

Other comments:

Was an interesting interview although interviewee seemed anxious; perhaps I didn't do enough to reassure, by this time my technique fairly practised. Interviewee was quite late and flustered on arrival (in their own office) perhaps this was an issue.

Research interview summary – no. 18 & 21

Participant: Contractor/site & Contractor/design
Age: 35-45
Profession: Contractors
Project: Project 3 – School - urban
Interview
date: 19 January 2011 & 10 April 2014

Interview Summary

Participant:

Joint interview with two members of the contractor team; the contractor/site was the project manager who oversees all the contractor side including QS, contractor/design was the liaison between the design team and the contractor – the design manager. Both had construction industry background with a fairly straight route through from undergraduate to site and project management, with time spent 'on the tools' during years out and post first degree. An understanding of all aspects of contractors role.

Project:

Viewed the project as interesting although doubted the validity, in terms of CO₂ savings, of some the environmental measures, especially with regard to specification and money/time saving issues.

Learning:

Acknowledge that a lot of learning takes place on every job, as each one has its own unique challenges and difficulties, in that respect no different to any other job. Made the distinction between themselves and the 'guys on the ground', who rarely showed any interest in environmental issues just wanted to get the job done.

Profession:

A lot of comments on the profession overall, environmental measures overall and the whole concept of sustainability. The direction the profession is moving and legislation.

Interview:

Very useful, can easily distinguish between interviewees. Provides a good insight into the contractors experiences of working on more environmentally oriented projects. Some brilliant insightful comments about the hypocrisy and contradictory nature of what some legislation and assessment methods are trying to achieve in the industry overall.

Other comments:

The second interview was with contractor/site only. Comments on the changes in the industry, particular focus on the recession, economics of environmentalism and the lack of progress really, compulsion, a good update.

Research interview summary – no. 19 & 23

Participant: Client/agent
Age: 45-55
Profession: Agent
Project: Commercial
Interview
dates: 7 March 2011 & 23 April 2014

Interview Summary

Participant:

Working for a major property agent. Role on the project was as client/agent.

Project:

Commented on commercial success of the project. Discussed the process of forward selling and renting the product before it was complete on site. Second interview reflecting back on project and the impact.

Learning:

Fewer comments on individual learning, talks more about the challenges of the project and the need for the industry to take those forward. Second interview there are comments that compliment and contradict the first, main learning is through the education of the tenants, educating them into accepting alternative aesthetics.

Profession:

Importance of the team and having a good team, tends to emphasise own role in the project and brief development.

Interview:

First interview face to face, second interview via telephone.

Other comments:

Both interviews very useful; particularly useful second interview as it highlights the lack of movement in the industry despite legislative change, puts development and the industry into context re time-scales and change.

Appendix C: Interview headlines

PHASE ONE INTERVIEW HEADLINES 2010/11:			
	Profession:	Project:	
P1	Architect (Arthur)	PROJECT 1 : House	Importance of research in practice. A strong ethical motivation; doing the right thing. Separate [aloof?] from the 'rest' of the industry; pioneering, ploughing his own furrow.
	Contractor/builder Contractor/engineer	PROJECT 1 : House	You've got to do 'this stuff' to retain competitive advantage. Different to 'mainstream', separate from the 'rest' of them. Regulatory and financial incentives only way to force a change. Focus on altruistic action/dissemination of skills and knowledge.
P2	Architect/senior Architect/project Architect/landscape Architect/researcher Architect/assistant Researcher Architect/experienced	PROJECT 2 : School - semi-rural	Significant focus on creating a working community, pushing the agenda, up-skilling the rest of the industry and leading the way. Emphasis on research. Make the change by example, community, support, respect and measured risk. Community environment in office – significant that they suggested the group meeting – the only practice to want to do it like that. We are a special group of people.
	Client	PROJECT 2 : School - semi-rural	Project transformed personal behaviour. Industry changed. Working with the architects inspiring, their commitment. Realistic about the economic limits – values shift in emphasis. Exposure to this project and relationship with change in personal motivations and values.
	Engineer/mechanical (Enzo) Engineer/structural	PROJECT 2 : School - semi-rural	Pragmatic approach, change will come through increased legislation and standards. M&E increasingly significant early in design. Over emphasis on 'sustainability' – focus should be good design, realistic and reduction in all waste.
	Architect/senior	PROJECT 3 : School – urban	Idealistic, trapped in a less idealistic practice. Holding true to values in an understanding there has to be compromise. Only do what you can and what makes sense, push the agenda a little whilst retaining commercial buoyancy. It's just good architecture – nothing special.
	Architect/project	PROJECT 3 : School – urban	Less experience; stuck to principles and values despite commercial pressure. A strong ethical stance, which runs through personal life as well. Transformative experience has led to commitment to environmental issues.
P3	Engineer	PROJECT 3 : School – urban	Incredible levels of technical detail and information – happier to talk about lux levels than values and motivations. Sees M&E as crucial in the role of carbon reduction/energy. Challenging accepted regulation, good at his job and knows it, longer-term thinking; investment is key.
	Contractor/site (Colin) Contractor/design	PROJECT 3 : School – urban	Personal commitment with a commercial realism. Architects are idealistic and unrealistic. Responsibility to company and client. We know how to do it, why don't you tell us you want it, we'll price it and build it. Change has to come through client/brief.
	Engineer	PROJECT 4 : Commercial	Team work and interesting job encourages you to do more, because you want to. Still in touch with other members of the team, several years later. Committed to monitoring performance, good brief, challenging job, make it work because you can, and want to.
	Client/developer	PROJECT 4 : Commercial	Sustainability by 'stealth' measures. Leading edge, pioneering, low technology solutions. Just behind the leading edge of the comet – at the front but out of danger of being bashed. Importance of cooperative team. Industry is still 'a bunch of hairy arsed blokes putting things together'.
	Client/agent (Clive)	PROJECT 4 : Commercial	Demand for change will come through building occupants – they create the demand. Legislation will help but assessment doesn't make sense (BREEAM) as you can 'cheat'. Commercial reality – some people won't ever care.
P4	Architect	PROJECT 4 : Commercial	Massive learning curve – biggest commercial job he's worked on as project architect – supportive team, no blame, helped each other. Lessons learnt – but still a long way to go on commercial side. Housing pressure isn't there. CPD doesn't provide what is needed.

PHASE TWO INTERVIEW HEADLINES 2014:			
P1	Architect – Arthur	PROJECT 1 : House	Construction industry – 'it's the last dinosaur, isn't it'. Tuning the boat around; surprised/pleased contractors have increased their knowledge, now equivalent to his, or more. A lot of learning through research projects and product development – ethical motivations for doing work. Economics has to stack up.
P2	Engineer – Enzo	PROJECT 2 : School - semi-rural	Practice is small and they retain their values within their work, can afford to do that – although industry requires compromise they were protected from recession. Could have done more on project if involved earlier. Increased significance of M&E engineers. Personal life shifted, increase responsibility and change, war weary.
P3	Contractor – Colin	PROJECT 3 : School – urban	Rejection of assessment methods but not the principles. Contractor firm leading the way – doing what they can and more. Building regulations need to tighten. If the client specifies it and pays for it then we'll build it. We should be doing more.
P4	Client – Clive	PROJECT 4 : Commercial	Regulation will become too difficult and stop development growth. Commercial realities take precedent, tenants are making the demand. Project played a role in educating tenants, changing expectations and aesthetics. 3 year isn't long enough to make judgements – 'come back in 10'.

SCOPING INTERVIEW HEADLINES 2010:			
Sp1	Architect/senior Architect Architect/project	SCOPING 1: Social Housing – urban	Community, relationships with community. Trying to give people what they want, rather than what you think they need. Could always do more. Contractors could do more. Lowest common denominator isn't enough.
Sp1	Architect/project	SCOPING 1 : Social Housing – urban	Learn through others. Learn by experience. Desire to make things better.
Sp2	Architect	SCOPING 2 : Social Housing – semi-rural	Planners need to be enablers through increased knowledge; all too often they thwart pioneering approaches or common sense.
Sp3	Architect	SCOPING 3 : Sports centre	It's just good architecture. Wanting to make it better. To leave a mark, an experience, an enjoyable place. Why wouldn't you want to do that?
Sp4	Architect	SCOPING 4 : Primary school	Interdisciplinary working – different backgrounds useful. Making a difference by small changes. Universities have to play a role.

Appendix D: Emergent themes

Summarised against the three analytical lenses of people, professions, and projects

OPPORTUNITIES FOR TRANSFORMATION: EMERGENT THEMES MAPPED AGAINST EACH ANALYTICAL LENS – PERSON, PROFESSION, PROJECT									
	COMMITMENT			COLLABORATION			COMPLIANCE		
	THE DEEP END	JUST WHO I AM	DOING THE RIGHT THING	SHARING AMBITIONS	FEELING AND BEING SEPARATE	VALUING REFLECTION	PUSHING BOUNDARIES	TICKING BOXES	ANTICIPATING CHANGE
PERSON (the people):	personal experience and those of others count	personally held values and attitudes impact environmental behaviours	deontological ethics – society and duty	working with like-minded people	not fitting in with the perceived norm	opportunity to reflect on work	challenging a business as usual approach	compliance is not enough	future directions and diversification, learning and new challenges
PROFESSION (architects, engineers, clients, contractors):	learning through doing – formal and non-formal routes	professional body regulation and alignment with personal values	adhering to a code of conduct and working beyond it	cross and interdisciplinary boundaries challenged – a no blame culture	frustration with professional practice and teaching	embedding reflective practice in the everyday	new ways of working across disciplines	compliance and creativity – pushing for change	professional roles changing and being challenged
PROJECT (the buildings):	invites questioning and challenges learning	project as learning rather than profit – challenges planning and preconceptions	capacity for responsive cohesion, performs according to design	project embodies physical evidence of aims	aesthetics and sense of place	importance of post occupancy evaluation	challenging the norm – site specific	compliance with regulation and assessment	future proofing fabric and services

Appendix E: Learning theory matrix









































orientations to learning (after Merriam and Caffarella 1991; Smith 1999; Sterling 2001)

	Behaviourist	Cognitivist	Humanist	Experiential	Situationist	Transformative
Learning theorists	Thorndike, Pavlov, Watson, Skinner	Bruner, Gagne, Kohlberg	Maslow, Rogers, Freire Jarvis, Alheit, Knowles	Dewey, Kolb, Boud, Jarvis	Bandura, Lave and Wenger, Salomon, Illeris	Mezirow; O'Sullivan, King, Taylor, Cranton, Dirkx
View of the learning process	Change in behaviour	Internal mental process (including insight, information processing, memory, perception)	A personal act to fulfil potential.	Direct participation in the events of life	Interaction/ observation in social contexts. Movement from the periphery to the centre of a community of practice	Critical awareness based on analytical psychology (Jung) – democratic and participative
Locus of learning	Stimuli in external environment	Internal cognitive structuring	Affective and cognitive needs	Primary experience (Jarvis addresses the issue of secondary)	Learning is in relationship between people and environment.	Change for the better – alters our way of being in the world
Purpose in education	Produce behavioural change in desired direction	Develop capacity and skills to learn better	Become self-actualized, autonomous	Learning by the people themselves	Full participation in communities of practice and utilization of resources	Concentrates on the role of education rather than the functions
Educator's role	Arranges environment to elicit desired response	Structures content of learning activity	Facilitates development of the whole person		Works to establish communities of practice in which conversation and participation can occur.	establishing an environment that builds trust and care and facilitates development of sensitive relationships
	Skills					Values
(Marton and Säljö 1976)	Surface					Deep
	Prescriptive/ Passive/Functional					Engaging/ participative
Four functions of education (Sterling 2001)	Socialization (replicate society)	Vocational (train for employment)		Liberal (develop individuals potential)		Transformative (encourage change towards fairer society)
	1st Order learning (information)	2nd Order learning (learning about learning)		3rd Order learning (creative shift in thinking)		
Blooms Taxonomy – Affective Domain	Receiving phenomena Listening/ remembering	Responding to phenomena Active participation, motivation	Valuing Internalisation of a set of often identifiable values, overt behaviour, commitment to value (through action?)	Organisation Prioritises values by creating a unique value system – synthesizing values		Internalising values (characterisation) value is characteristic of the learner – value system controls behaviour
Kohlberg (moral development)	Blind egoism/ Instrumental egoism , self interest – socialisation – obedience and punishment	Social relationships perspective Interpersonal accord	Social systems perspective Authority and social order		Contractual perspective Social contract orientation	Mutual respect a universal ethical principle
	Level 1 (pre-conventional)	Level 2 (conventional)		Level 3 (post-conventional)		
Transformative (Mezirow 1991)	disorienting dilemma	Critical reflection	Rational discourse		Emancipatory praxis	Transformation in perspective
Learning involves	External situation	Line of action	Communication process		Self-concept	Meaning perspective















Appendix F: Free Nodes

Example of NVivo analysis from interviews no1 and no2










































Free Nodes

	Name
	accelerating change
	acknowledging challenge and difficulty
	acknowledging more learning to do
	acknowledging rare opportunity
	acting on beliefs
	appreciating opportunity
	appreciating your position
	because you can...
	being engaged in new expereinces
	being explicit about own values
	being happy and confident
	being prepared to change
	being pushed by the client
	berating others
	changing professional approach
	changing to keep work
	changing views
	communicating information
	communicating new ides with confidence
	communicating new learning
	compromising
	confronting conflict over old ways
	constraining factors
	creating a heirarchy
	demonstrating how much they have changed
	differentiating between practice and theory
	disparaging of others attempts
	disseminating knowledge
	distancing oneself from past
	doing the actual work probably isn't a moral thing
	doing the 'math'
	doing the 'right thing'
	doubting new specification
	early practice important
	emphasising own ability to adapt and learn
	emphasising own success
	engaging in new techniques and methods
	enjoying the process
	exceeding expectations
	exploring new technical territory
	expressing pride in the outcome
	feeling an outsider
	feeling disconnected from the 'rest' of the profession
	feeling lost on job, underinformed
	feeling rooted














Free Nodes

	Name
	feeling uncomfortable with professional practice
	feelings of frustration with process
	feelings of frustration with the way things are now
	feelings of guilt
	feelings of not being heard
	focusing on an environmental action
	following instinct
	following through with actions
	formal education
	forming new relationships
	forwarding their learning
	frustration with the profession
	gaining confidence in new knowledge
	giving something back
	giving up time for others
	going beyond moral agenda
	good actions being undermined by users
	growing up with it
	hypochracy in others
	identifying environmental agenda
	identifying learning at university
	identifying learning opportunity
	identifying need for education
	identifying opportunities for change
	identifying own learning
	identifying relevance of sustainability
	implementing new learning
	initial reluctance to take on job
	innovating new techniques
	It's not rocket science
	lacking confidence in early career
	lacking motivation for action
	learning degrees of transformation
	learning from your mistakes
	learning is sporadic
	learning new technical skills
	learning through experience
	making intuition clear
	making the point about financial incentive
	making the same mistakes over again
	managing change
	moral incentive
	motivating through regulation and reward
	needing to communicate own learning
	normalizing innovation

Free Nodes

	Name
	offering solutions
	opportunity to 'be better'
	past disappointments
	perceiving conflict between environmental responsibility and practice
	persuading others
	placing importance on environmental action
	placing importance on own role and skills
	placing importance on research
	placing importance on university
	placing work in context
	placing yourself apart from the industry
	praising colleagues knowledge
	praxis dissonance
	predicting change in wider professional practice
	progressing learning
	proposing strategies for energy conservation
	pushing boundaries of learning
	pushing the environmental agenda forward
	questioning value of the project
	realising change through learning
	reckognising more to do
	reflecting on education
	reflecting on own position
	reflecting on own qualities around learning
	reflecting on personal actions
	reflecting on the norm
	reflecting on university education
	registering potential conflict
	seeing a big change in others
	seeing transformation in others
	self doubt
	self sacrifice for others
	separating one self from the industry
	showing frustration with specification
	taking learning to new projects
	taking on new challenges
	thinking in different ways
	thinking of others
	training for change
	transforming others embedded thinking
	translating theory to practice
	turning point
	understanding the importance of early communication
	understanding the need for change
	understating achievements

Free Nodes

	Name
	using facts and figures
	using formally aquired knowledge
	using theory for practice
	valuing practical skills
	valuing sharing of knowledge
	volunteering
	wanting to communicate own learning and skills
	wanting to do things in their own way
	Wasting stuff is a disgrace
	willing to take learning forward
	winning the arguement
	working on new technical item
	working to live