



SCHOOL OF THE BUILT ENVIRONMENT

**A STUDY OF THE TRANSFER OF TACIT KNOWLEDGE
BY A MONITORED TUTELAGE PROGRAMME
FOR QUANTITY SURVEYORS**

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ABSTRACT

This thesis is about how tacit knowledge may be transferred. Its aim is to develop a coaching and mentoring programme for Quantity Surveyors. The literature synthesis includes a discussion of tacit and explicit knowledge and a review of knowledge creation, management and transfer. It includes theories of knowledge transfer and a review of concepts involved in mentoring and how it is carried out for knowledge workers in several professions. The review concludes that there is a knowledge gap relating to tacit knowledge transfer in many professions including quantity surveying and that there are several approaches to transferring this knowledge. Tacit knowledge is used by knowledge workers in addressing problems in their work. Action Research is suitable for this.

The thesis sets out the way that Action Research formed the basis of developing a monitored tutelage programme (MTP) for transfer of tacit knowledge. The development of an MTP became the methodology for research using the Plan, Act, Observe, Reflect iterations of Action Research. Research followed three stages: a pilot workshop to help determine specific tacit knowledge gaps, a structured questionnaire to determine features of these gaps and a series of four monitored workshops comprising the MTP. Workshops were used to implement and validate findings from the literature review and research. Thesis conclusions were that as a result of the review and Action Research, there was a knowledge gap in relation to the transfer of tacit knowledge to graduate Quantity Surveyors, this gap may be addressed by an MTP, Action Research is suitable for development of an MTP and the MTP developed could successfully transfer tacit knowledge.

Potential beneficiaries of an MTP include quantity surveying practices using the programme, programme participants, professional bodies, third level institutions, HR and senior management in firms, workshop mentors and subject matter experts, career experts and employment agencies.

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LIST OF ABBREVIATIONS

ADR	Alternative Dispute Resolution
A&E	Accident and Emergency
AL	Action Learning
AI	Artificial Intelligence
ALAR	Action Learning Action Research
APC	Assessment of Professional Competence
AR	Action Research
ARGI	Action Research Group Ireland
ATM	Automated Teller Machine
BIM	Building Information Modelling
BOQ	Bill of Quantities
CEO	Chief Executive Officer
CIOB	Chartered Institute of Building
CM	Construction Manager
COP	Communities of Practice
CPD	Continuous Professional Development
CQS	Construction Quantity Surveyor
EA	Ethical Approval
EOT	Extension of Time
EU	European Union
FIDIC	Fédération Internationale Des Ingénieurs-Conseils [Contract Type]
FK	Forum for Knowledge Exchange
GC	General Conditions

GDP	Gross Development Product
GIFA	Gross Internal Floor Area
GNP	Gross National Product
HBR	Harvard Business Review
HR	Human Resources
ICT	Information and Communication Technologies
ICU	Intensive Care Unit
IEI	Institute of Engineers Ireland
ILAC	Incorporates the following: Identify the problem (basis of case fundamentals and legal argument) Law or legislation (research similar legal actions searching for precedence) Apply the preceding case law to your individual case or action Conclude with best legal advice for your client
IQ	Intelligence Quotient
ISME	Irish Small Medium Enterprises
IT	Information Technology
KC	Knowledge Creation
KM	Knowledge Management
KT	Knowledge Transfer
KTI	Knowledge Transfer Ireland
MBTI	Myers Briggs Type Indicator
MEP	Mechanical Electrical Plant
MRI	Magnetic Resonance Imaging
MTP	Monitored Tutelage Programme

NEC	New Engineering Contract [Contract Type]
OD	Organisational Development
OECD	Organisation for Economic Cooperation and Development
PhD	Doctor of Philosophy
PM	Project Manager
PMO	Project Management Office
PPE	Personal Protective Equipment
PPQS	Professional Practice Quantity Surveyor
PQS	Professional Quantity Surveyor
PQSL	Pre-Qualification Structured Learning
PWC	Public Works Contract [Contract Type]
QNHS	Quarterly National Household Survey
QS	Quantity Surveyor
R&D	Research and Development
RCSI	Royal College of Surgeons Ireland
RFI	Request for Information
RFP	Request for Proposal
RIAI	Royal Institute of the Architects of Ireland
RICS	Royal Institution of Chartered Surveyors
SCSI	Society of Chartered Surveyors Ireland
SECI	Socialisation, Externalisation, Combination and Internalisation
SER	Structured Ethical Reflection
SME	Small Medium Enterprises
SME	Subject Matter Expert

TCD	Trinity College Dublin
TKT	Tacit Knowledge Transfer
UCD	University College Dublin
UK	United Kingdom
USA	United States of America
WFP	Work Force Planning

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The subject matter of this thesis is education in relation to the built environment. This education is multidisciplinary and research primarily focused on how knowledge, developed as a result of experience, may be transferred from experienced Quantity Surveyors to those who have recently graduated. The knowledge exchange method employed was a mentoring programme specifically designed for the transfer of relevant tacit knowledge to graduates.

The training methods for Quantity Surveyors vary significantly and to the same degree as the types of organisations where graduates are employed. Whether the graduates flourish or not often depends on the size and complexity of the organisation, the willingness of the learner and the forum for such knowledge to be transferred. According to Gaffney (2015), when an individual employee is frustrated in life or employment, they may feel that their spirit is trapped. In contrast, when they receive direction or coaching to experience vitality and life again, they may discover that what they are doing is what they were 'put into the world to do', to flourish. This thesis examined the training needs of graduate Quantity Surveyors and identifies how tacit knowledge can be harvested from experienced personnel and transferred through a mentoring programme. The term 'graduate Quantity Surveyor' used in this research refers to Quantity Surveyors with between one and five years' postgraduate working experience.

By way of background the author, during a long career as a practising Quantity Surveyor, frequently witnessed graduates becoming perplexed, frustrated and at times distressed at the difficulty in acquiring tacit or implied knowledge. Tacit knowledge transfer is, at times, problematic and this thesis defines the associated transfer problems and examines a variety of solutions.

The rationale of this research has been to identify whether humans can discover their training needs and wants and subsequently address these successfully through an effective programme that is conducted in a manner that has the agreement of all the stakeholders.

The research consisted of three steps. The first part of the research investigated whether there is a gap in current (2020) knowledge and literature about knowledge transfer for graduate Quantity Surveyors. If such a gap exists, the second step in the research is to investigate how best to address the issue and, as a third step, how to implement a bespoke mentoring programme as a contribution

to existing knowledge and practice. The research process was influenced by Action Research methodology which is discussed in Chapter 2.

The complexity of the construction and property industries gives rise to a specific uniqueness. The deliverables from these industries depend upon a broad cross section of professions, volatility to investment, how prices and valuations are compared and strong government influence (Ashworth and Hogg, 2002, Hillebrandt and Cannon, 1994). A construction project team may include a number of professions depending on the complexity of the project. Generally, the team consists of a project manager, an architect, a structural or civil engineer, a Quantity Surveyor, a services engineer and whatever specialist consultants are required for each bespoke project. Examples of such specialist consultants are health and safety consultants, fire consultants, assigned certifiers, traffic specialists, acoustic engineers and environmental specialists. When the project advances to site, the team expands to include the main contractor, sub-contractors and specialist trades, suppliers and others. The Quantity Surveyor's contribution is primarily that of cost control and reporting back to the client and/or their financial advisors. This is done from inception of the project through to the life cycle of the building for many years after practical completion (Seeley, 1997). The challenge for graduate surveyors is to gain practical and useful knowledge to support and sustain the competitive advantage of their organisations.

The goal of this research is to produce a meaningful, useful and purposeful contribution to the training needs and wants of recent quantity surveying graduates. It is hoped that the 'learning by doing' approach outlined in this thesis and contained in the Professional Doctorate programme will mean that continuous life-learning from experienced professionals in iterative cycles will never conclude but continuously evolve to the next sequential learning programme stage. Raelin and Coghlan (2006) indicated that after five days, less than five percent of learners remembered less than a tenth of what they had heard during a lecture. When activities were used that involved seeing and hearing, retention increased to 20 percent. However, when learners learned from doing, they retained 60 to 70 percent of what they practiced.

The findings of this research may act as a benchmark against which further research may track tacit knowledge transfer techniques for graduate Quantity Surveyors. Collaboration of all stakeholders was essential for completing this research. The stakeholders included experienced mentors with many years of management and professional practice expertise, academic course leaders and participants, chartered quantity surveying practice CEOs and HR management.

1.2 Research question, aim and objectives

The research question may be subdivided into three parts but all are addressed in the methodology used in the research for this thesis. The first question was, 'is there a gap in the current knowledge and literature about the transfer of tacit knowledge to recent graduates? The second was 'is it possible to transfer relevant tacit knowledge from experienced professionals to recently graduated Quantity Surveyors?' And the third part was: 'can this transfer be done as an effective and worthwhile process?' The first part of the question is largely addressed by the information in the literature review. It is expanded and deepened when the Action Research methodology is implemented when carrying out the monitored tutelage programme (MTP) as the means of addressing the second and third parts of the research question.

The aim and objectives of this doctoral research are:

Aim:

To develop a coaching and mentoring programme for graduate Quantity Surveyors to enhance tacit knowledge transfer from experienced professionals.

Objectives:

1. To review, evaluate and synthesise the literature on tacit knowledge creation, management and transfer for graduate Quantity Surveyors.
2. To analyse training techniques for graduate Quantity Surveyors.
3. Using Action Research methodology, to investigate possible strategies for knowledge retention, transfer and succession planning through a monitored tutelage programme.
4. To evaluate from the data generated and collected for the research, the positive and negative aspects of a monitored tutelage programme for graduate Quantity Surveyors using experienced professionals as tutors.
5. To analyse and appraise the potential restrictions and enabling factors of implementing a bespoke mentoring system. This aim stems from the research question 'can the transfer of implicit knowledge be done as an effective and worthwhile process?'

1.3 Choice of Professional Doctorate research and journey

The researcher's decision to pursue a Professional Doctorate was greatly influenced by forty years' experience working as a Quantity Surveyor. This period of accruing relevant professional tacit knowledge led the researcher to reflect on how best to assist and support graduate Quantity

Surveyors, particularly in how to avoid making repeated mistakes and judgement errors. The author was also keen to help young professionals strive for ethical professionalism in their careers.

A professional doctoral research journey generally begins with identifying a practice problem and seeking an efficient and effective resolution (Nsibande, Kempton and Chynoweth, 2015). Trafford and Leshem (2008) suggested that the first step was to identify the research destination (end) and work back through execution and planning to the research starting point (beginning). As T.S. Eliot wrote:

*“What we call the beginning is often the end
And to make the end is often the beginning
The end is where we start from.”* (Eliot, 1974, p.208)

Trafford and Leshem further suggested that establishing the relationship between the ‘ends’ and beginnings of research helps in:

- “Clarifying the scholarly purpose of research to show the final destination of the research.
- Using judgements of merit for a thesis as criteria of quality throughout the research itself.
- Converting merits of quality about the end of the research into explicit standards of scholarship and presentation.
- Auditing progress towards achieving a successful examination right from the beginning of the research.” (Trafford and Leshem, *op cit.*, p.12).

Lee (2009) suggests that, once a research pathway has been set out, the researcher should establish a personal toolkit using the workplace, professional institutions, research networks and the wider academic support or collegiate partners. These form a ‘community of practice and research’.

In conventional study, research students take responsibility for their own journey, the execution of the research and the formation of conclusions. Using a community of resources provides a framework of advance learning and known tacit information and knowledge. A community also provides a strong element of reciprocity (Lee, *op cit.*). Professional doctoral researchers usually work with practical problems or dilemmas. Research challenges that are identified may include a dynamic experience that is often not possible with traditional doctoral research.

1.4 Justification of the research

Quantity Surveyors, like the majority of construction professionals, attend third level education either fulltime or part time over a 4 to 5-year period. Usually this period does not include a

significant element of practical training. Therefore, the majority of Quantity Surveyors commence employment as an intern, informed academically but lacking a significant amount of practical experience. For this they are relying on the interest, time and resources of their employer and peers. The Assessment of Professional Competence route with the Society of Chartered Surveyors Ireland/Royal Institution of Chartered Surveyors usually commences after a few years of work experience, allowing the employee the benefit of planning their career. The target for the Quantity Surveyor then focusses on achieving chartered status.

The lack of support and potential solution to this process forms the background for this research. With significant focus and mentoring support, the candidate could have a much more informed journey through the process to becoming a chartered Quantity Surveyor. They could also be a more mature, more tacitly informed, and hopefully a more valuable and useful employee.

The MTP process should support the candidate's 'learning by doing' with access to industry experts in supporting their learning at a critical stage of their career development. The programme aims to capture the candidate's enthusiasm and enhance their tacit learning at a critical point of their career development. The programme can then encapsulate the learning needs of the individual participant, support the necessary training for APC preparation, encourage the employer and senior management to become a 'learning organisation' for the future of all its employees.

The Assessment of Professional Competence (APC) and Continuing Professional Development (CPD) are the two principal methods of professional competency training for Quantity Surveyors. To reach chartered status within their professional institutions and societies it is mandatory for Quantity Surveyors to pass the APC process. The research in this thesis will examine if a bespoke monitored training and mentoring programme can enhance and support these two long-established competency training standards. The involvement of the employer organisation which involves regular feedback from the mentoring programme may improve identification of the training needs and outcomes for the candidates. The APC and many CPD programmes tend to be geared towards the professional practice Quantity Surveyor. They often exclude areas of expertise sought by construction firm Quantity Surveyors. Typically, construction firm Quantity Surveyors need support with estimating packages, marketing tools, and specific knowledge areas not usually catered for by their professional institutions and societies. These areas of knowledge used by surveyors working on behalf of contracting firms, may also be of benefit to professional practice Quantity Surveyors. They may help to provide them with greater career flexibility. With this extra knowledge they may more easily change to employment in the contracting sector.

The research process is outlined in Figure 1.1 encapsulating the research process from background to undertaking the research, exploration of current literature, choosing appropriate research methodology, Action Research processes 1 to 3 and finally the mentoring programme conclusion.



Figure 1.1 Structure and Logic of the research process

1.5 Research process and methodology

The research cycle spanned a four-year period with 70 participants yielding 2,800 pieces of data for analysis and discussion. Data collection commenced in August 2015 and completed in January 2019. Details of the data collection phases are set out in Chapter 3. The three stages of research consisted of:

- (1) A pilot workshop to test the appetite for a focused mentoring programme as a vehicle for transferring tacit knowledge to graduate Quantity Surveyors.
- (2) Administration of a semi-structured questionnaire to a class of postgraduate students in Trinity College Dublin.
- (3) The design and hosting of four workshop sessions. These included four breakout-feedback sessions with the candidates after each mentored workshop. The purpose of this was to glean any further research reaction.

Action Research was selected as the research methodology for this study. The specific reasons for this choice are set out in the methodology section. The implementation framework for the Action Research was that each of the data collection phases was pilot tested and employed the iterative and cyclical framework of Action Research.

The final data from these data collection phases then advanced to the validation testing stage. It was tested with Action Research workshops, where the selected candidates worked closely with a coach or mentor, working on pre-set tasks and working alongside their peer group.

These actions were repeated in a *plan, act, observe and reflect* model until an interim conclusion was reached to the satisfaction of the mentor.

The final results were then discussed with the candidate's employer and HR Manager to determine if any critical knowledge gaps existed in the employees' training programme and how these might be addressed through participation in a subsequent knowledge transfer and retention programme.

1.6 Summary of contribution to knowledge

The contributions to knowledge arising from the research in this thesis fall into several categories. The contributions are all related to the research aims and the research process as outlined in Figure 1.1.

The first contribution addresses the question 'is there a need for tacit knowledge transfer for Quantity Surveyors?' The literature review, survey of postgraduate construction professionals and

the outcomes of the Action Research as part of the MTP sessions all established that a need exists throughout the profession for the transfer of tacit knowledge.

The second contribution is that a large body of publications relating to both theory and practice has established that the nature of tacit knowledge is well understood in a general sense, even though there are some conflicting points of view. For example, some writers consider that almost all tacit knowledge is capable of conversion to explicit knowledge. Others consider that in many cases some tacit knowledge will always evade conversion. This is particularly the case when human interaction is involved. The research has also established that there is a lack of knowledge about the methods and processes of tacit knowledge transfer, especially for Quantity Surveyors. The lack is greater still when it comes to determining the most efficient methods of tacit knowledge transfer for Quantity Surveyors.

The third contribution relates to the choice and of methods for the transfer of tacit knowledge. An MTP was proposed and tested using the idea of an Action Research focused methodology. The Action Research process found that the MTP provided an effective method for tacit knowledge transfer. It was also established that Action Research was an appropriate research method as it allowed an assessment of the efficiency of the MTP as it evolved along with the quantity surveying profession.

1.7 Outline of thesis chapters

Chapter 1 Introduction

This chapter establishes the foundation for the rest of the thesis. It provides an overview of the rationale behind the research and outlines the aims and objectives of the thesis. The choice of Professional Doctorate research and journey is outlined and discussed. The justification for this study is identified as being to highlight the gaps in knowledge that the research sets out to fill.

This evolving ‘action by doing’ approach to research proved to be a slow, arduous and tough ‘step by step’ route to a meaningful conclusion. In athletic terms it became more of a marathon than a sprint. This approach was deemed most appropriate for the research and the research process was influenced by the ideas of Action Research’s *plan, act, observe and reflect* actions.

The summary of contributions to knowledge is introduced in Section 1.6.

Chapter 2 Literature Synthesis and Review

A review and synthesis of the available relevant literature is provided in Chapter 2. There is also an analysis and discussion of how other professions deal with the transfer of knowledge and make

tacit knowledge both available and explicit. Chapter 2 also examines the techniques by which knowledge may be transferred and how knowledge workers may be motivated to share critical tacit knowledge.

Techniques such as instructional scaffolding, communities of practice and situated learning are discussed and analysed. Knowledge management is discussed from creation and cultivation through to critical tacit knowledge management, transfer and final retention. These are discussed from the points of view of the employee and the organisation. Chapter 2 explains the training route adopted by a Quantity Surveyor through the various stages of competency testing for the professional institutions and societies. The roles and responsibilities for both the professional practice Quantity Surveyor and the contractor Quantity Surveyor are discussed. Tacit knowledge transfer and Action Research methodology are discussed and analysed.

The significance and evolution of Building Information Modelling is briefly discussed. Obstacles to knowledge sharing are discussed and highlighted. Potential stakeholders for a knowledge retention programme are defined.

Chapter 2 also examines artificial intelligence and how it has impacted on graduate Quantity Surveyors. The final part of Chapter 2 examines the values and virtues of mentoring and coaching programmes.

Chapter 3 Research Methodology

Chapter 3 sets out the reasons for the choice of Action Research as the research tool for this study. The research paradigm and philosophical framework are also discussed. The Action Research techniques adopted for the framework of the monitored tutelage programme are investigated, analysed and justified.

Data collection research instruments are explained and the various stages of the research process are discussed.

The ethical approach for this research is explained.

Chapter 4 Findings

The phases of data collection are examined and presented. These phases are the pilot workshop, the structured questionnaire with 60 postgraduate construction professionals and finally the testing and validation process via Action Research workshops. The workshops are used as a framework for the iterative coaching and mentoring cycles. The data and research findings are presented for

analysis and discussion in Chapter 5. The emergent Monitored Tutelage Programme is discussed and displayed.

Gaps in professional training are discussed.

APC and reasons for deferral are highlighted.

Implementation of a knowledge retention programme is discussed.

Chapter 5 Discussion

The emergent Monitored Tutelage Programme is discussed and displayed.

Gaps in professional training are discussed. APC and reasons for deferral are highlighted.

Implementation of a knowledge retention programme is discussed.

Chapter 6 Conclusions

This final chapter outlines the conclusions drawn from the research, discusses the contribution to knowledge and discusses how the research aims and objectives were achieved. It also notes the limitations of this thesis. The research outcomes and beneficiaries are highlighted. Some outlines for further study and research are suggested after a consideration of the thesis limitations. The key findings are summarised and commentary set against the original research questions. This chapter also contains a discussion of the rationale for embedding tacit knowledge transfer within the construction education curriculum. Finally, this chapter concludes by discussing how academic and theoretical knowledge has changed as a result of this thesis.

CHAPTER 2

LITERATURE SYNTHESIS AND REVIEW

2.1 Introduction to the literature synthesis and review

This review was undertaken as part of the process of addressing the aims and objectives of the thesis. Like most research reviews much was discovered that was not directly relevant but still informed the research process. Comments are included in the review where they help the reader to understand which literature had direct relevance and which literature was relevant at a broader level. Where literature seemed not to be relevant, this is indicated also.

Knowledge creation, knowledge management and knowledge transfer, which are the subject of this thesis, have been the subject of a large body of research up to 2020. Examples of extensive literature covering research on these topics include Argyris (1993); Nonaka and Takeuchi (1995); von Krogh, Ichijo and Nonaka (2000); Gourlay (2002); Ichijo and Nonaka (2007); Leonard (2011); Hislop (2013); Leonard, Swap and Barton, (2015); Matos (2016); Lambe (2016); and Milton and Lambe (2016).

Current (2020), definitions relating to knowledge creation, management and transfer include:

- Knowledge
 - *Knowledge* is defined as a justified true belief which is not easy to transfer (Soanes and Stevenson, 2008). The ease of transfer depends on the category of knowledge.
- Tacit knowledge
 - *Tacit or implicit knowledge* is largely linked with experience which may be undocumented but relatively easy to articulate. Leonard, Swap and Barton, (2014, p.23) believe that “some behaviours and thinking processes are so deeply buried that even their practitioners are totally unaware of them”. To transfer this deeply buried knowledge is very difficult as it may be undocumented and subconscious. One possible method of transfer of deeply buried tacit knowledge proposed by Leonard *et al.* (2014), is a workshop mentoring environment and repetition of specific tasks to assist graduates to develop their own tacit knowledge.
- Explicit knowledge
 - *Explicit knowledge* can be transferred to the graduate from sources such as books, lectures, presentations, contacts and customer details, reports, and company archives.

- Knowledge creation
 - Knowledge creation is closely linked with innovation, enhanced product development, quality of problem-solving and tangible effectiveness at both individual and organisational level (Mitchell, 2006).
- Knowledge management
 - To manage an intangible asset, such as knowledge in an organisation, management must examine how this knowledge became embedded in the organisation, how it is implemented and how it is sustained. Management should also define the lessons learned during the process (Milton and Lambe, *op cit.*).
- Knowledge transfer
 - Knowledge may be transferred or shared through processes such as electronic sharing and communities of practice. It may also occur through mentoring via subject-matter experts (SME) or experienced executives (Leonard *et al.*, 2014).

For the construction industry and industry in general, the trend to strive for a leaner organisation has heightened since the turn of the 21st century. The iterative cycle as depicted in Figure 2.1 shows the cycle of initiating or creating new knowledge.



Figure 2.1 Knowledge Cycle (Boylan, 2019)

The management of this new knowledge and its incorporation into an organisation by a process of agreement and consensus can increase the efficiency of an organisation. Each knowledge worker knows more, and the risk to an organisation posed by the loss of tacit knowledge is reduced as the tacit knowledge becomes known by more people. An important research question becomes, ‘how may this newly acquired knowledge, both tacit and implicit, be managed to best effect?’ The ‘best effect’ is defined as the betterment of the individual (knows more) and the organisation (more

efficient and less exposed to risk). The term ‘managed’ here includes incorporation and sharing of the new knowledge into the organisation. The mode of ‘management’ is by organisation and consensus.

The most common method by which organisations incorporate newly acquired knowledge is for them to purchase it. Company acquisition often includes the procurement of critical expertise. The buying company either enhances its own products and services and/or improves and energises its current knowledge bank. Identifying new sources of customer demand, stimulating personal and organisational growth and rethinking the existing ground rules can help an organisation develop, thrive and endure. Failure to do so may lead to stagnation and decay (Garfield, 2018).

The resultant newly generated knowledge must be robust and capable of being critiqued and changed in order to progress to the next cycle of management. In reality, corporate takeovers often include casualties for both good and bad reasons. An example of a good reason may be that management styles and personalities clash with new personnel, and it may be in the best interest of both the individual and the organisation to part company in order to allow unimpeded progress. An example of a bad reason may be an error of judgement by senior personnel whereby they discard valuable contributors at the early stage of integration, thus losing critical knowledge.

Many of the publications cited above suggest that organisations’ effective management of in-house knowledge would enhance their competitive edge. Competitiveness is key to survival for any organisation and successful companies endeavour to maintain it (Porter, 1998; Gupta and Sharma, 2004). If companies are to compete on the international stage, then managing and transferring knowledge within their organisation may be the single most important component of their business strategy. At the heart of global competitiveness are ambitious organisations striving to improve innovation, performance and productivity. Retention, management and transfer of critical knowledge is a key factor in sustaining a competitive edge (Leonard, 2011).

In the author’s opinion there are several ‘key factors’ in retaining competitive edge. Quantity surveying practices are frequently at the mercy of sudden economic shifts and may have to willingly release key knowledge workers who possess such critical knowledge to reduce salary and running costs.

The corpus of published literature relating to tacit knowledge has a wide and varied range, covering topics such as sociology, knowledge creation and management, psychology, philosophy, adult learning, leadership, business ethics and religious beliefs. Companies displaying innovation which

encourage critical knowledge transfer and embrace the distribution of vital information place themselves in an advantageous competitive position (Clarke, Holifield and Chisholm, 2005).

The author concurs with this statement but, from a quantity surveying perspective, practices may struggle at times to finance such innovation when faced with meeting monthly salary and running costs. It is admirable to promote such innovation but not always practical. According to Burns (2001), knowledge is now seen as the true source of power in 21st century organisations.

Innovative companies accrue a wealth of critical knowledge in their individual personnel. Should they lose this critical knowledge personnel they could also lose valuable organisational knowledge. According to Clarke *et al.* (2005) small to medium sized organisations may be more vulnerable to such a loss. With normal employment attrition, technical and experienced staff may leave an organisation with valuable critical knowledge. This knowledge may not always be recognized by the organisation. If this knowledge is not shared or retained the survival of the company may be threatened. It may have taken many years to accumulate, retain and use this hard-earned knowledge. It is a challenge for a novice Quantity Surveyor to accelerate the acquisition of a working knowledge of both the construction industry and the organisation. To use the explicit knowledge acquired in academia the novice would often approach a senior colleague for advice on measurement, how to compile a budget document or how to analyse sub-contract prices. Management must ensure the possessor of this tacit knowledge is both suitably qualified to give such advice and best positioned to transfer such knowledge. This 'knowledge enabler' is discussed in greater detail later in this chapter.

The order and sequence of this literature review is: first, to look at tacit and explicit knowledge, how it is cultivated and created; then, how this is managed and, finally, how it is transferred for retention by both the individual and the organisational pool of knowledge. This review also examines how other professions such as legal, military, medical and organisational management generally have succeeded in making tacit knowledge explicit.

The aim of this chapter is to critically review past and current literature and to establish the process by which tacit knowledge can become explicit, and ultimately how this process can be developed for Quantity Surveyors. Knowledge and training gaps have been identified in this research process. The parties empowered to address this concern are the employer and the organisation's supervisors. There also needs to be interaction between professional institutes and the employer. Finally, an independent monitored career counsellor is required for the individual or graduate Quantity

Surveyor. The beneficiaries of a bespoke knowledge transfer programme would be the graduate, the employer organisations, professional societies, institutes and industry generally.

This chapter concludes with the tacit knowledge education, training and transfer process for Quantity Surveyors. It indicates how this research may establish a new foundation for tacit knowledge transfer.

2.2 Tacit knowledge origination; tacit and explicit knowledge dichotomy

Fundamentally, there are two types of knowledge: explicit and implicit. This division may be described as a dichotomy. For example, Conklin (2001, p.6) describes this separation as “formal and informal knowledge. Formal knowledge is sourced in books, manuals and documents which can easily be shared, and informal knowledge is the knowledge that is applied in the process of creating formal knowledge.”

Explicit knowledge is knowledge capable of codification to enable it to be organised, categorised, portable and relatively easy to understand. Management can describe it, model it, simulate it and allow it to become embedded into the organisation’s bank of knowledge (Davenport and Prusak, 2000). “This knowledge comes in the form of books, documents, databases and manuals.” (O’Dell, Grayson and Essaides, 1998, p.3). Traditionally this form of knowledge is transferred explicitly from schoolteachers and from college lecturers using books, slides and explicit presentations to convey this form of knowledge to the student.

A good example of explicit knowledge transfer is the assembly instructions included with furniture and fitments where the detail is laid out explicitly for the assembler to follow. It is usually set out in clearly defined steps to be followed carefully using explicit sketches or drawings setting out the sequential steps of assembly. It is assumed that the assembler has no prior knowledge of, at times intricate, pieces and the successful end result is dependent on adhering to the step-by-step instructions.

Michael Polanyi was a Hungarian-born philosopher (originally a chemist) who was associated with the University of Manchester for much of his academic career. He stated “We can know more than we can tell...Take an example: We know a person’s face and can recognise it among a thousand, indeed a million. Yet we usually cannot explain how we recognise a face we know. So, most of this knowledge cannot be put into words.” (Polanyi, 1966, p.4). “The distinction between tacit knowledge and explicit knowledge has been described in terms of ‘knowing how’ and ‘knowing that’, respectively” (Ryle, 1949, p.279). Transfer of tacit knowledge may be problematic and is

explained in greater detail later in this thesis. Transfer may be dependent upon context, the individual's level of knowledge and the recipient learner's willingness to accept this knowledge. Contemporary literature is consensual about the fact that the sharing of tacit knowledge via information technology is extremely difficult if not impossible to achieve (Matos, 2016). "Conversation is the most common mean that facilitates the transfer and development of the more deeply rooted tacit knowledge" (Matos, 2016, p.32).

Ryle claimed tacit knowledge could arise from introspection, but more generally it came from experience. He called this process "interiorization of particulars". Polanyi agreed that we need coherent arguments for scientific communication but cautioned that this alone could be interpreted as 'unbridled lucidity' which could destroy our understanding of complex matters, (Muir-Walker, 2017). "The act of knowing includes an appraisal: and this personal coefficient, which shapes all factual knowledge, in doing so bridges the disjunction between subjectivity and objectivity." (Polanyi, *op cit.*, p.300). Polanyi believed it unsuitable to simply focus on tacit known facts and to convert them into explicit knowledge as a method of transferring tacit knowledge (Tsoukas, Schultz, Maguire, and Langley, 2012).

Codified knowledge is used in practice while theoretical knowledge may be considered objective and is grounded in personal judgements and tacit commitments (Tsoukas *et al.*, *op cit.*). While Polanyi is considered to have originated the term 'tacit knowledge' (Polanyi, *op cit.*, p.4), it was Nonaka and Takeuchi (*op cit.*) who popularised the concept of tacit knowledge management in practice. In describing tacit knowledge, Tsoukas uses the example of a geographical map. A map is a representation of a specific territory. One of its functions is to guide an individual from point A to point B. While the user may be very familiar with the map itself, three things must be addressed in order to use the map correctly. First, we must fix and identify our current location on the map. Second, we must define the map location of our destination. Third, to get to our destination, we must identify certain landmarks in the surrounding landscape. "Therefore, no matter how elaborate or detailed the map is, we must use our cognitive and sensory abilities to relate to and use the map successfully" (Polanyi and Prosch, 1975, p.31). Polanyi further pointed out that the intricacy of seeing, hearing and touching need to correspond between the explicit formulations such as the map and the fundamental experiences of our senses. In Polanyi's explanation of riding a bicycle or, more particularly, not falling off a bicycle, he states "for a given angle of unbalance the curvature of each winding is inversely proportionate to the square of the speed at which the cyclist is proceeding" (Polanyi, 1962, pp.49-50). Knowing and understanding this analytical description may not be helpful to the cyclist, as retention of balance is perceived as

implicit or tacit, while engaged in the activity of cycling the bike in the first place (Tsoukas, 2002). Polanyi argued that “tacit knowledge is not at all like explicit knowledge because knowledge of the mathematical formula for keeping balance on a bike is ineffectual unless known tacitly” (Polanyi, 1969, p.195). “While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood, hence his claim that all knowledge is tacit or deeply rooted in tacit knowledge.” (Polanyi, *op cit.*, p.144).

Numerous other but related views are expressed in the available literature on tacit knowledge. Polanyi (1966, p.4) stating “we know more than we can tell” implies tacit knowledge exists solely in our subconscious. Nonaka and Takeuchi (*op cit.*) defined tacit knowledge as that which may be different for each of us. Johannessen, Olaisen and Olsen (2001) concluded that tacit knowledge was manifested in tradition, thus impeding innovation. Conversely, Gascoigne and Thornton (2013) maintain that if tacit knowledge is practical and context-driven then there is an argument that because of articulation that this may not be knowledge in the first place. Tacit knowledge is largely procedural knowledge often closely connected to action to realise people’s goals (Sternberg and Horvath, 1999). As soon as knowledge is made explicit and codified it may cease to be relevant on an individual basis. For example, if an individual purchases a personalised Christmas gift for a client and this action finds favour with the client, then this has tacit advantage for the individual who purchased the gift. However, if all the customers purchased gifts for the client the tacit advantage is lost as the gift will no longer differentiate an individual customer from the mass of customers (Sternberg and Horvath, *op cit.*).

Van de Wal (2013) used the metaphor of the iceberg to illustrate that the vast majority of what we truly know is hidden or in our subconscious. As with the iceberg, Van de Wal suggested that 95 percent of hidden knowledge is tacit and based on experience, thinking, competence, training and commitment. The visible five percent is explicit and comprises data, information, document records and files.

Tacit knowledge may be unwritten, unspoken and represents the vast repository of knowledge held by human beings to varying degrees. To be imparted correctly and efficiently (Haldin-Herrgard, 2003), it may require joint or shared activities. “In an organisational context it can be practical, action-oriented, experience based, context-linked and personal.” (Svieby, 1997, p.30).

According to Tsoukas, “tacit knowledge cannot be easily captured, translated or converted but only displayed or manifested in what we do” (Tsoukas, 2001, p.16). “New knowledge comes about, not

when our skills become explicit but when our skilled performance (our *praxis*) is punctuated in new ways through social performance.” (Tsoukas, *op cit.*, p.158). Apprenticeship training would be a good example of this process. In practice, “apprentices work with their masters and learn craftsmanship not through language but through observation, imitation and practice.” (Nonaka and Takeuchi, *op cit.*, p.63). The emergence of tacit knowledge in social science and organisational management parlance has had an interesting provenance with significant lexicon milestones commencing with Polanyi’s study of personal knowledge in the 1950s. Argyris (1990) studied the consequence of defensive reasoning and unspoken knowledge within organisations. Kogut and Zander (1992) showed how tacit knowledge is linked to work routines.

Polanyi’s personal knowledge could also be defined as ‘active comprehension of things known’. Tacit knowledge is best thought of as context dependent, conceptually structured and practice know how. According to Gascoigne and Thornton (*op cit.*, p.169), “a speaker’s understanding of learning a language consists of tacit knowing and theory of meaning, or a grammar for that language”. “If the person who cognized the grammar and its rules could miraculously become conscious of them, we would not hesitate to say that he knows the grammar and its rules, and that this conscious knowledge is what constitutes his knowledge of language” (Chomsky, 1980, p.70).

Janik (1990) and later Gourlay (*op cit.*) set out to categorise tacit knowledge in terms of specific things in life that cannot be simply put into words and things in life that may be just inexpressible in plain language. The former consisted of industry or trade secrets with examples of a joiner or cabinet maker with implicit or tacit specialist skills that may not easily transfer to an apprentice or trainee. Gourlay concludes that, if people truly bothered to analyse these skills, they could in fact be transferred. He further argued that no intractable barriers exist to converting this tacit knowledge to explicit knowledge. The latter category, inexpressible in words, relates to odours or audible sounds. Examples included identifying a musical instrument such as a concert harp by hearing one or two audible musical notes. These are purely sense-driven and create an experience by sound or smell. For instance, it is difficult, if not impossible, for an individual to transfer tacit experiences such as coffee smell, wine aroma, fragrance and taste. This kind of tacit knowledge transfer can only be gained through the practice of experiencing the sensation (Janik, 1988). Gourlay (*op cit.*) cites Janik (*op cit.*) to explain that if we have to learn how to accomplish something before we know how to follow the rules for doing it, eventually this rule-following rests with the actual practice and activity. The author would question Gourlay *i.e.*, that if skills were analysed, they could in fact be transferred. The act of transfer is far more complex and the example given of the

apprentice joiner can only be successful if communication and time is allowed for the process to occur plus the willingness of the learner apprentice to accept and retain this knowledge.

Drucker (1959) focused on the competitive advantage organisations can experience using individual knowledge and learning. In 1995, Nonaka and Takeuchi's virtual model showed how individual knowledge can drive organisational innovation. Davenport and Prusak questioned how organisations can create an environment where knowledge can flourish. Later, they declared that "knowledge is a fluid mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experience and information" (Davenport and Prusak, *op cit.*, p.5). Dorothy Leonard, working with Walter Swap, (Leonard and Swap, 1999) discussed the best physical and psychological environment for creativity to prosper in organisations and again in 2005 showed how 'deep smarts' can make firms competitively valuable. Leonard *et al.* (2015) cited how management is tasked with the transfer of critical tacit knowledge and how important it is to avoid the loss of such an asset. They also explained how proven techniques can be used to transfer knowledge when its loss is imminent. This process is knowledge transfer but highlighting the effect of an organisation losing this critical knowledge could be to the detriment of the organisation. Examples could include a key person leaving a position with inherent tacit knowledge and joining a competitor for monetary, career or job satisfaction reasons.

The author concurs with Davenport and Prusak's comments above but finds Leonard's comments on the learning environment to be understated. As later discussed in this thesis creating such an environment is contingent on a myriad of factors with organisations. Such factors include the willingness, openness and resources of organisations to create a proactive, innovative and user-friendly work environment to co-exist with a competitive and profit-driven viable organisation.

Nonaka and Takeuchi (1985, p.8) stated that "The tacit-explicit dichotomy is omnipresent in the analysis of organisational embedded knowledge. Explicit knowledge, from an objectivist perspective, is synonymous with objective knowledge. Suffice to say that explicit knowledge is regarded as objective, standing above and separate from both individual and social value systems and, secondly that it can be codified into a tangible form." They also stated that "This codification refers to knowledge that is transmittable in formal systematic language." An example of codified knowledge would be an IT firm where employees could be rewarded for codifying their knowledge or where knowledge is transferred from people to documents. Tacit knowledge may not be fully explicit such as juggling, swimming, cycling, mental arithmetic, metal welding or creating a

successful advertising slogan (Hislop, 2013). Kimani (2017) citing Hutchins (1995) declared that tacit knowledge is not only present in individuals but also distributed through a social workforce jointly working on similar activities. This suggests that tacit knowledge is enabled by a group and not by individuals acting alone. This finding was a key component in the eventual design of a monitored tutelage programme for the transfer of tacit knowledge where a group of people participated in the process. The tacit knowledge ability is with the individual creative person not with the organisation. The firm or company is made up of individuals who collectively create this knowledge culminating in a creative mass working within the organisation.

Examples of work-related tacit knowledge include the ability to write good computer software, the ability of a skilled craftsman to produce high-quality goods, the ability to be an effective leader and the ability to solve complex problems (Hislop, *op cit.*). Baumard (1999) concurs with this view that tacit knowledge is created through social interaction of which ‘communities of practice’ would be a practical example. One of the principal characteristics of tacit knowledge is the challenge to analyse and codify it as it is not generally tangible and requires collective input and work to transfer successfully to explicit knowledge. This may occur through practices such as mentoring or a group of individuals passionate for innovation, creation and collective knowledge (Matos, 2016). According to Nonaka and Takeuchi (*op cit.*) “tacit knowledge is subjective, it is knowledge of experience, it is based in the here and now and is practice-based analog knowledge. Explicit knowledge is objective, it is knowledge of rationality and the mind, it is based in the ‘there and then’ and is theory based digital knowledge.” (Nonaka and Takeuchi, *op cit.*, p.61).

TACIT KNOWLEDGE	EXPLICIT KNOWLEDGE
Inexpressible in a codifiable form	Codifiable
Subjective	Objective
Personal	Impersonal
Context specific	Context independent
Difficult to share	Easy to share

Table 2.1 Characteristics of Tacit and Explicit Knowledge (Hislop, 2013, p.21)

In Table 2.1, Hislop (*op cit.*, p.21) further expanded and outlined the principal characteristics of tacit and explicit knowledge.

2.2.1 Knowledge: philosophical milestones

Tracing back through the various milestones of knowledge philosophers, one could start with the Greek philosopher Plato (427BC - 347BC). The history of Western epistemology (epistemology being the philosophical basis of how we know what we know) stems from the readings of Plato and Aristotle through the developments of rationalism and empiricism. Rationalism suggests that knowledge can be obtained by reasoning, whereas empiricism suggests that knowledge is obtained through sensory experience (Clarke, 2010). For Plato, the physical world is just a “shadow of the perfect world of ideas”.

According to Nonaka and Takeuchi, “human beings aspire towards the eternal, unchanging, and perfect ideas that cannot be known through sensory perception but only through pure reason” (Nonaka and Takeuchi, *op cit.*, p.22). It is the author’s opinion that most human beings never give this concept a thought. Baumard (*op cit.*) sought to establish a philosophical dimension based on the studies of the ancient Greeks who distinguished between four different types of knowledge of which two were “practical and social wisdom” and “conjectural wisdom” which appear akin to tacit knowledge (Baumard, *op cit.*).

Gourlay (*op cit.*) citing Scharmer (2000) proposed a distinction of two types of tacit knowledge. The first was knowledge that is embedded and embodied in everyday life as described by Polanyi and Nonaka. The second was what Scharmer denotes as self-transcending knowledge that is not yet embodied but is based on imagination and aesthetic experience. Scharmer claims that this second form is sustainable and leads to competitive advantage (Gourlay, *op cit.*). However, these proposals remain as concepts and do not appear to have been subjected to empirical analysis.

In the 17th century the French philosopher Descartes espoused that the mind was very different from the brain. He claimed that self-awareness and consciousness distinguished the mind from the brain. This theory was criticised by John Locke, the 17th century British philosopher who claimed that knowledge was purely based on experience. He claimed that these experiences ultimately provided the mind with ideas. Descartes focused on the importance of mathematical and abstract ideas whereas Locke concentrated on experience and observation (Nagle, 2014). In Book 11 of his *Essay Concerning Human Understanding* Chapter 1.2, Locke outlined his beliefs on how we as humans acquire the materials of knowledge. Among the concepts he put forward was *Tabula Rasa* which is the epistemological idea that individuals are born as a ‘blank slate’ without hardwired or built-in mental content. He believed that all knowledge emanates from experience or perception. Immanuel Kant, the eighteenth-century German philosopher, accepted Locke’s theory but also

argued that experience was not the sole source of knowledge. “Though all our knowledge begins with experience it does not follow that it all arises out of experience” (Kant, 1781, p.41).

Ryle (*op cit.*) argued against Descartes’s theory of the relationship between the mind and the brain. He maintained that practical reasoning proves there is a link between the skilful performance of the mind over the actions of the body.

In 1983, Donald Schon wrote that “Tacit knowledge is deep rooted in actions, procedures, routines, commitments, ideas, values and emotion” (Schon, 1983, p.25). This was followed in 1995 when Nonaka and Takeuchi concluded that tacit and explicit knowledge are mutually complementary rather than entities. In fact, they interact between the creative activities of human beings.

Table 2.2 shows subjective and objective entities.

TACIT KNOWLEDGE - SUBJECTIVE	EXPLICIT KNOWLEDGE - OBJECTIVE
Knowledge of experience (body)	Knowledge of rationality (mind)
Simultaneous Knowledge (here and now)	Sequential Knowledge (there and then)
Analogue Knowledge (practice)	Digital knowledge (theory)

Table 2.2 Two Types of Knowledge (Nonaka and Takeuchi, 1995)

2.2.2 Transferring tacit knowledge to explicit knowledge origination

There are various theoretical models for transferring tacit to explicit knowledge. One such model derived by Nonaka is the SECI (Socialisation, Externalisation, Combination, Internalisation) model as outlined in Figure 2.2. “Socialisation involves the conversion of existing tacit knowledge to new forms of tacit knowledge” (Nonaka and Takeuchi, 1995, p.62). Externalisation involves transforming tacit to explicit knowledge. Combination integrates different forms of explicit knowledge in order to form a new explicit knowledge. Lastly, internalisation involves transforming explicit knowledge into tacit knowledge.

Nonaka starts with socialisation in the cycle. He maintains it is the impulse of individuals to collaborate and share explicit knowledge and this acts as a catalyst to create new knowledge.

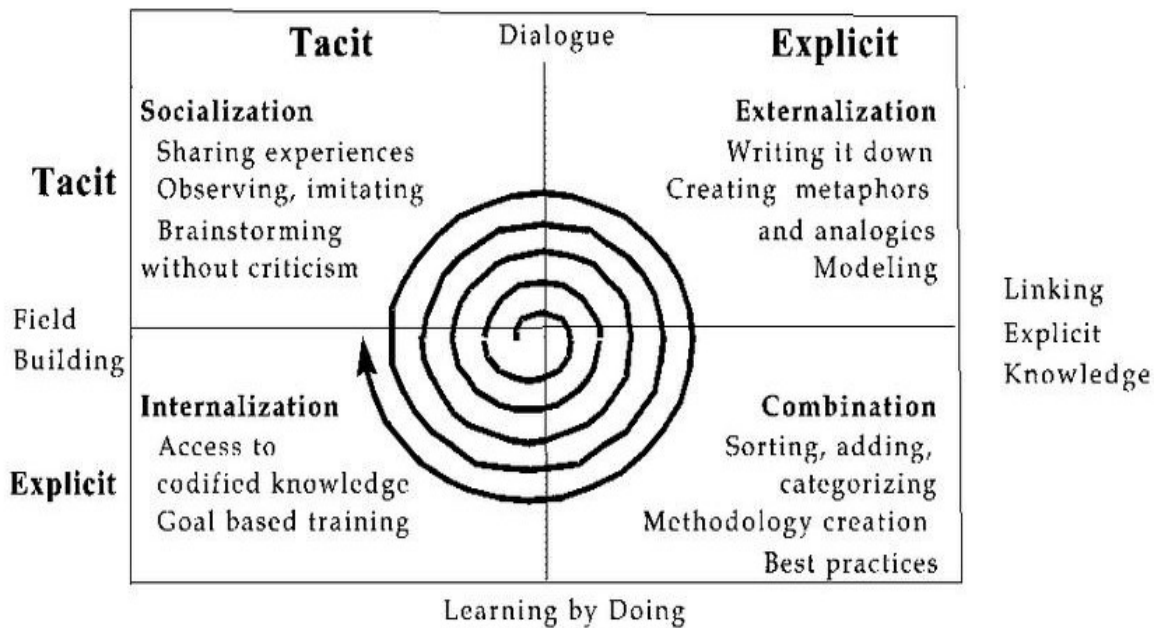


Figure 2.2 SECI Model of Knowledge Creation (Nonaka and Takeuchi, 1995)

Nonaka and Takeuchi postulated the above four modes of converting knowledge, assuming that individuals interacting are key to creating knowledge. In the socialisation mode tacit knowledge is transferred in the group. Examples include ‘brainstorming sessions’ where management and staff would meet to discuss potential resolutions for project problems. In the original Japanese format, it took the form of informal meetings often in weekend resorts to share baths and drink sake together to discuss intricate project problems. These creative forums were a mechanism by which participants could have a healthy dialogue to seek project solutions. The dialogue could be held without criticism in a harmonious way through conversation, observation, imitation and practice.

The second mode is externalisation. In this mode tacit knowledge is transformed into explicit knowledge. Tacit knowledge is articulated into explicit concepts. Knowledge is triggered by dialogue and collective reflection. This mode relies on writing out the process and creating metaphors and analogies. The Japanese examples are again from the automotive industry, where the designers held concept clinics to gather opinions from customers and end-users to produce an innovative car which both excites the customer and provides a comfortable drive. Similarly, they devised the concept of a family car by creating more people space and a compacted engine space. This emerged through the analogy ‘man-maximum and machine-minimum’. Once an explicit concept is created through analogies and metaphors they can then be modelled and advanced to the next pre-production stage.

The third mode is combination: explicit knowledge is transferred to make more explicit knowledge, *i.e.*, ‘explicit to explicit’. This is where individuals meet to exchange and combine knowledge via

documents, presentations, video links and communication networks. Data is sorted, added to and categorised resulting in an organisation's best practices statement. "At senior management and board level the combination mode is fulfilled when mid-range concepts such as product development are integrated and incorporated into grand concepts such as corporate vision." (Nonaka and Takeuchi, *op cit.*, p.163). An example of the result of the combination mode is Unilever's ice cream product 'Magnum' where product innovation changed the public perception of taste and appearance. The product innovation was backed by an intensive advertising campaign commanding market advantage (Kaplan, 2012). This involves the transfer and "conversion of explicit knowledge to tacit knowledge. It is often referred to as learning by doing" (Nonaka and Takeuchi, *op cit.*, p.22).

In 2017/2018 a study was carried out by Baldé and Maynard (2018) using the SECI model to examine the impact of trust and motivation in the workforce. They wished to know how this affected the employee's knowledge creation process. The study acknowledged the usefulness of the model. It concluded that both knowledge creation and knowledge sharing must consider trust and motivation if creativity is to be encouraged. However, SECI has also had its critics (Senaratne and Sexton, 2008; Maqsood, Walker and Finegan, 2007; and Arif, Khalfan, Barnard and Heller, 2012). While they generally endorsed the model, they suggested selecting elements of the four modes to personalise and maximise its use. The authors identified imbalances within the four modes but generally encouraged the *socialisation* and *externalisation* modes.

Another such concept is the *Ba* model which can be defined as "a shared space for emerging relationships" (Nonaka and Konno, 1998, p.40). The Japanese concept of *Ba* was articulated by Nonaka (See Figure 2.3). The building blocks of this model were based on the works of the Japanese philosopher, Kitaro Nishida, who proposed the Concept of *Ba* in 1958. It has since evolved as a constituent of knowledge creation theory. *Ba*, meaning 'context' or 'shared place' enables knowledge creation by facilitating interpersonal interactions. These interactions can be physical or virtual.

Originating Ba (Tacit to Tacit)	Interacting Ba (Tacit to Explicit)
Exercising Ba (Explicit to Tacit)	Cyber Ba Explicit to Explicit

Figure 2.3 Ba Concept (Nonaka and Takeuchi, 1995)

Ba also refers to shared mental space in terms of common assumptions, values, practices and knowledge that people can develop and share (Hislop, *op cit.*).

The concept of *Ba* can be divided into four areas:

- ‘Originating *Ba*’ – knowledge creation’s primary phase, where individuals share tacit knowledge one to one with others.
- ‘Interacting *Ba*’ – by means of externalisation (dialogue, formalisation of information), tacit knowledge is transformed to explicit.
- ‘Cyber *Ba*’ – by means of combination, newly explicit knowledge is joined with existing knowledge, and forms a more advanced knowledge level.
- ‘Exercising *Ba*’ – through the application of experience, novel ideas and via training, explicit knowledge is converted to tacit knowledge.

According to Nonaka, “*Ba* can be thought of as a shared space for emerging relationships. The space could be physical (*e.g.*, an office or a dispersed business space), virtual (for example email or teleconference) or mental (such as shared experiences, ideas, ideals) or any combination of them.” (Nonaka, 1998, p.40).

One benefit of *Ba* is that it may foster relationships within communities. According to Ichijo and Nonaka “*Ba* is essentially a shared space that serves as a foundation for knowledge creation. The concept of *Ba* unifies the physical spaces, virtual spaces and mental spaces involved in knowledge creation.” (Ichijo and Nonaka, 2007, p.276).

Both SECI and *Ba* methods formed the basis of discussion with the host company later in this thesis as the template for workshop formation and the cyclical format of knowledge transfer.

2.3 Knowledge cultivation and creation

2.3.1 Brain's index system and neuroscience

Using the brain's index system, the hippocampus, the brain can organise items of work in a structured fashion. This facility requires practice and discipline. Neurons of the brain are like muscles in the body and require regular exercise and oxygen (Levitin, 2015). The brain's neural system harnesses a latent power that can achieve and deliver greater recall and performance through practice. Our brain can react to sudden change with rapid action, such as avoiding an oncoming car when driving or providing the ability to stop or swerve suddenly if required. Therefore, in a professional capacity, we can alter our experiences and beliefs as the need requires. According to neuroscientists, the human brain's structure may undergo some modification as a result of accepting new encoded data for retrieval later as needed. In order to capture complex experienced-based knowledge the individual's brain must contain receptors or neural structures to accept and connect this new information or data (Leonard, *op cit.*).

When finding solutions to a problem in our daily work life, the brain requires us to devote our full attention to the problem. The brain of a cardiac surgeon working on intense operations under immense pressure is quite different from that of a construction professional seeking a construction or economic solution to a project problem. The brain is equally taxed in all these functions and the result is dependent on experience and on the amount of analytical thinking the individual applies to resolving the problem. Similarly, a graduate dealing with a project problem for the first time will search for opinions from colleagues, weigh up options and research into alternative solutions before reaching a conclusion. When faced with the problem a second time the explicit solution may become an implicit reaction based on a successful experience from the previous problem. This knowledge becomes invaluable tacit knowledge for both the individual and the organisation (Levitin, *op cit.*). Levitin interviewed Scott Grafton, a neurologist based in California, who declared that experience and tacit knowledge are the two most important assets a doctor can develop during training. Doctors need to quickly recognise the problem using skills and experience acquired through extreme reinforcement learning. A good doctor will utilise tests, physical examination and patient history to ply his tacit knowledge for the best patient treatment outcome (Levitin, *op cit.*).

The creation and sharing of new knowledge in a mutually agreed forum usually rests with individuals. A broad range of publications exist to support this assertion for the creation, management and sharing of new knowledge (Grant, 1996; Grover and Davenport, 2001). Drucker (*op cit.*) also supports this concept and suggests that this activity increases organisational productivity. Compilation of such knowledge repositories rests with the knowledge workers within these organisations (Kim, 1993). Organisational knowledge can then prosper through the culmination of effort by their knowledge workers (Senge, 1990). “Insights and innovative ideas occur to individuals with technical know-how, not organisations.” (Nonaka and Takeuchi, 1995, p.69). Knowledge intensive organisations such as the IT industry, universities, the pharmaceutical industry, the electronics industry, search engine organisations and the food industry to name but a few, are not productive unless their individual members can display learning and innovation skills. The objectives and goals of organisations can therefore only be achieved if the individual knowledge workers agree to create, manage and share this new found knowledge (Grant, *op cit.*).

Nonaka argues that an organisation is not an inanimate object but an active organic entity with a primary collective goal. The knowledge creating company is as much about *ideals* as it is about *ideas* which fuel innovation. In the late 1970s, the Japanese motor company Honda developed the innovative slogan ‘let’s gamble’ when developing a new design for the Civic and Accord car models. This successful change was led by a strategic group of auto engineers with an average age of twenty-seven. Their goal: to make a car that was inexpensive but not cheap. This knowledge creation and innovation transformed the company and ensured financial strength, viability and a solid workforce who felt they had collectively contributed to the future sustainability of their company (Nonaka, 1995).

According to Nonaka, “the economies of the twentieth century confirm that the only certainty is uncertainty and the one true source of retaining competitive advantage is knowledge.” (Nonaka, 1991, p.96). Companies that flourish will be those capable of creating a new knowledge base and disseminating this new knowledge. These companies with innovative outputs are identified by knowledge creation and sustained innovation. These activities define the knowledge creating companies whose sole business is continuous innovation. “Japanese companies realised in the early 1990s that creating new knowledge is not simply a matter of processing new subjective information.” (Nonaka, *op cit.*, p.96). They recognised that to make this new insightful knowledge available for testing by the company depended on the ability to tap into “the tacit and often highly subjective insights, intuitions, and at times hunches of the individual employees” (Nonaka, 1998, p.24).

Paul Lauterbur and Peter Mansfield won the Nobel Prize in 2003 for their Magnetic Resonance Imaging (MRI). Their neuroimaging gave neuroscientists tools to visualise and measure brain anatomy in human beings. Neuroscientists at The University of Liverpool capitalised on this tool by selecting twenty-six musicians who had learned to read music notation from an early age followed by daily practice and compared their brain size with twenty-six non-musicians. A working musician must be visually and spatially aware, interpreting musical notation in precise spatial orientation. Orchestral playing also requires further spatial awareness and positioning in the orchestra layout. The MRI results indicated the selected musicians had 699 cubic millimetres more grey matter than the non-musicians (Andreasen, 2005). Similarly, construction professionals such as architects, engineers and Quantity Surveyors must work in a focused and applied routine yet be spatially aware on site of quantum and technical detail in a way similar to that of a trained musician. Supported by coaching and training over a period, a graduate would gain the necessary work experience and team player spatial skills in the same way that an orchestral musician combines a culmination of talents to produce a professional music piece. Andreasen also suggests that mental fitness for professionals can be exercised daily in the same way as physical fitness in a gym or with a trainer. Her suggestions include choosing a new and unfamiliar area of knowledge and exploring it in depth, spending a short time period each day simply sitting and thinking in silence and practicing observing and describing what has been seen. According to Andreasen, these simple techniques result in a calmer attitude towards problem solving at work and ultimately lead to improved mental health for the individual.

2.3.2 Induction process and lessons learned

For construction companies, knowledge creation, management and exploiting ‘lessons learned’ is not a new concept in relation to their research and technology demands.

The ‘lessons learned’ procedure occurring after projects have ‘closed off’ may form part of the final handover report for the client organisation. However, even with companies where this practice has become part of the standard operating procedure, it is difficult to find instances of the resulting document being referenced in the next project, or being referred to by subsequent projects (Conklin, 1993). A graduate or intern could benefit from an effective ‘lessons learned’ procedure. The establishment and monitoring process of such a procedure relies heavily on senior management and company policy.

As part of organisational induction, newly employed graduates may be faced with basic administrative tasks to help them become familiar with the organisation and related terminology.

This familiarisation process is the beginning of the accumulation of a knowledge stock for the graduate. The perceived menial task of sorting out daily post for an organisation requires a basic level of skill, discretion and use of tacit knowledge. Non-delivery or wrong delivery of post could have negative repercussions for the recipient, a department or even the entire organisation. Nurturing tacit knowledge at the ‘onboarding’ stage of new graduate employees may be critical for both graduate and organisation. Both managerial staff and newly employed graduates face a similar dilemma of how to transfer, retain and grow the organisational knowledge for the organisation, to retain competitiveness, market share and ultimately prosper and grow (Milton and Lambe, 2016).

The questionnaire survey later in this thesis shows the perceived importance of induction and the onboarding process for new employees. In the author’s opinion, Milton and Lambe are correct in stating that nurturing tacit knowledge from the onboarding stage is critical but they fail to say that if the employee chooses to leave the organisation the exit interview process could be equally important for both the employee and the organisation.

In the Obama administration, Mike Kelleher was director of the Office of Correspondence in the White House. “He supervised forty-nine full time employees, twenty-five interns and a team of volunteers to sort out the 65,000 paper letters, 500,000 emails and 5,000 faxes that arrived weekly. Many of these letters and communications required the president to formulate a reply but first required filtering, consideration and discussion before a selection was presented to the President each week. Interns had to quickly grasp the reality of the constant flow and volume presented to them every morning.” (Levitin, 2015, p.303).

For the benefit of the graduate or intern it is important that organisation management build a definitive link between the cultivation stage of their acquired knowledge and the predetermined tasks it sets out to deal with.

According to Davenport and Prusak (2000) these links can be defined as follows.

“People whose job it is to transfer knowledge to and from front-line knowledge work processes at the core of the organisation.

Project management approaches to ensure that in each phase of a process there is a review of what has been learned and what needs to be learned next.

Prototypes of knowledge work processes, in which knowledge creation and use is maximised as a design objective.

Process designs that specify how knowledge is to be used at different points in the flow of work.

Programming in computer systems that supplies the right form of knowledge.”

New employees may not see themselves as knowledge workers, often due to the initial unstructured process of internship. The onus is on the organisational management to encourage the intern to participate in the knowledge flow for the betterment of the individual and the organisation (Davenport and Prusak, *op cit.*). While a single person can have a creative insight, groups of people can work together to create new, useful ideas (knowledge creation) that they cannot create alone. Some group characteristics and processes (such as diversity, argumentation, politeness and shared positioning) facilitate knowledge creation. Groups with diverse views can create more ideas, representations, justifications and solution proposals than groups with similar views. This is especially the case, when group members understand and value each other’s diverse contributions (Matos, 2016).

Once graduates enter the work environment, unless they have had the benefit of relevant work experience, they rely heavily on the acquisition and recollection of explicit academic knowledge. Inadequate induction or inclusion in a relevant training programme means that graduates have to rely on their own thought and reflective processes. “Reflective thinking involves the individual overcoming the inertia that inclines one to accept suggestions at their face value.” (Dewey, 1910, p.13). Dewey further asserts that where an individual has a daily, hourly or even momentary need to ascertain facts which he has not directly learned or observed, he must understand that these facts are adding to his general stock of knowledge. This knowledge may be critical for his own interests and occupation. Construction and property practices and organisations are like other commercial entities in terms of skills, technical ability, competitiveness and management systems. In general, core capabilities are the same. Leonard argues that perhaps the most critical part of the collection of core capabilities is its intangible knowledge assets. This exists as tacit knowledge, which has been accumulated over years in an organisation through dynamic, unstructured and often subtle processes (Leonard, *op cit.*).

2.3.3 Creative individuals in organisations

Leonard and Swap (1999) noted that not all organisations may have officially designated creative people whose creativity may give the organisation a competitive edge. Individually, creative people exist in all or most organisations and this talent should be encouraged for the benefit of the organisation. “For such individuals, some combination of temperament and life situation has given

them idiosyncratic lenses through which to view the world. Creative innovation is the embodiment, combination, and/or synthesis of knowledge in novel, relevant, valued new products, processes or services” (Leonard and Swap, *op cit.*, p.7).

For a group of individuals or an organisation to prosper from creative innovation, the suggested change or reform should be discussed, analysed and even trialled to ensure its effectiveness in delivering a positive result. A popular method of such discussion is the Devil’s Advocate approach. In this method an appointed person would argue to the contrary, exploring the potential negative effect of such an innovation or change. In the Roman Catholic church tradition, for example, the Devil’s Advocate is an official of the Congregation of Rites whose duty is to point out defects in the evidence upon which a case for beatification or canonisation rests. The Devil’s Advocate must have the full support of the group, be a good role player, focus on the issues and refrain from personal attacks (Leonard and Swap, 2005). The person chosen to act in such a role should be experienced, capable of analysing the situation and broadminded in outlook towards change.

Nonaka and Takeuchi (*op cit.*, p.57) assert that, “in a strict sense, knowledge is created only by individuals. An organisation cannot create knowledge without individuals. The organisation should support creative individuals or provide platforms for them to create knowledge. Organisational knowledge creation therefore should be understood as a process that ‘organisationally’ amplifies the knowledge created by individuals and crystallises it as a part of the knowledge network of the organisation.” “This process takes place within an expanding ‘community of interactions’, which crosses inter-organisational levels and boundaries.” (Nonaka and Takeuchi, *op cit.*, p.59). The author concurs with Nonaka and Takeuchi regarding individual knowledge crystallising into a network of organisational knowledge. However, the author’s experience has shown that this is strongly supported by the learner’s development with ‘niche skills’ which is often the case with Quantity Surveyors. Advancing from project to project, especially serial contracting, the learner develops skills in measurement technique, BIM application knowledge or dealing and negotiating with contractors and sub-contractors and other skills. This ‘niche’ knowledge, which is often tacit knowledge, accelerates projects and builds confidence for both the individual and the organisation.

Quantity Surveyors, both in practices and contractor-based, are not generally viewed as the creative element of a construction management team. Their principal role is to deliver cost certainty for a client using tried and tested methods. Using Quantity Surveyors to deliver cost control gives a project’s financial backers and institutions the confidence that the project’s financial control is in safe hands.

The research in this thesis looks beyond the current APC and CPD frameworks of the professional institution for Quantity Surveyors, to determine how these processes could be enhanced and encouraged by monitored training and mentoring. The current APC and CPD procedures do not necessarily include the employer's active involvement in training, coaching and mentoring processes for the Quantity Surveyor. Initiation of this research was not a criticism of how the professional bodies handled training for APC and CPD. It is hoped that a positive conclusion from the research may augment and support both processes.

This research investigates how such training could be enhanced by a knowledge transfer programme for the sharing of tacit knowledge to graduate Quantity Surveyors. Additionally, the high attrition rate of senior Quantity Surveyors during the boom and bust economic cycles together with the annual influx of new graduate surveyors creates two separate but defined populations of employees.

2.3.4 Information and communication technologies

Since the beginning of the 21st century the development and adoption of information and communication technologies (ICTs) has been unprecedented. The upsurge in ICTs led to a general optimism by organisations that it should now be possible to streamline, transfer and codify the critical knowledge within them (Hislop, *op cit.*).

“ICTs are technologies which allow and facilitate the management and/or sharing of knowledge and information. Thus, the term covers an enormous diversity of heterogeneous technologies including computers, telephones, e-mail, databases, data-mining systems, search engines, the internet, and video conferencing equipment.” (Hislop, *op cit.*, p.203). ICTs should be a way that organisations can transfer monitored critical knowledge. This includes peer to peer knowledge transfer. For tacit knowledge to be transferred successfully, management may insist that it can, at least initially, supervise and approve sharing of knowledge on the intranet or on social media platforms.

As discussed earlier, “explicit knowledge is formalised and codified and is sometimes referred to as ‘know-what’.” (Brown and Duguid, 1998, pp.90-111). Identification, capture and retrieval are relatively simple (Wellman, 2009) and this kind of knowledge is best processed by knowledge management systems (ICT). These are highly effective and facilitate the storage and retrieval of documents and texts as ICT can deal with significant amounts of explicit raw and processed information simultaneously. From a management viewpoint, the biggest issues with explicit

knowledge involve accessibility to relevant data, appropriate archiving and flexibility in updating and reviewing when required.

Some knowledge experts perceive explicit knowledge as being superior to implicit or tacit knowledge. (e.g., Brown and Duguid, 1991; Cook and Brown, 1999; Bukowitz and Williams, 1999). The perception is that tacit knowledge contains experienced know-how with the ultimate advantage of generating a competitive edge for the organisation. Past experience has shown that the technology industry was at fault for targeting explicit knowledge only. The emergence of many IT innovative products labelled as knowledge management systems frequently resulted in explicit knowledge management software. “Hence, explicit knowledge is found in databases, memos, notes, documents and the like.” (Botha, Hourie and Snyman, 2008, p.18).

If ICTs are to be used successfully for tacit knowledge transfer, all participants and recipients of knowledge should be clear on the use and the purpose of this valuable portal. Kauppila, Rajala and Jyrama (2011) give a good example of the codification of knowledge in a geographically dispersed, cross-functional, virtual team. They referred to a Finnish company which designed and manufactured industrial measuring equipment. People in the marketing, sales and R&D functions were working remotely, and management encouraged the establishment of an ‘information sharing portal’ to improve organisational communication. The company wished employees to have access to all relevant information and to encourage a culture conducive to joint creation of new knowledge (Kauppila *et al.*, *op cit.*). In general, knowledge sharing worked but with an emergent development. Sales staff found the information useful but did not codify their own knowledge and experience on the portal. Marketing staff codified their knowledge on the system but failed to regard it as the sole source of communication and knowledge sharing. Kauppila’s explanation for this anomaly was the difference in knowledge type held by both sales and marketing teams. Marketing staff knowledge was, in the main, product related knowledge and technological specifications (reasonably easy to codify), while sales information was more customer-related, context specific and nuanced (not easy to codify).

The emergence of BIM (Building Information Modelling), in the construction industry is an example of the successful management of data in construction projects. From its inception BIM has been portrayed as the ultimate solution to improving project delivery. In reality, twenty years on, we find mostly the larger construction and consultancy companies are using BIM. The medium sized and smaller firms have not yet embraced the technology in numbers due to difficulty in

sourcing skilled operators, acquisition, training, upkeep and maintenance costs of the software package.

BIM has proven communication advantages by delivering 3D project visualisation, clash detection with design elements such as pipework installation, reduction of reworking drawings and available design information available at the immediate behest of all design stakeholders. For Quantity Surveyors it has allowed accurate element costing and reporting and provides clients with real time design updates and cost certainty.

BIM has been embraced by the social media generation. In this researcher's opinion the uptake and use of BIM software has been accelerated through knowledge sharing on Twitter and via 'blogs'. An example of such platforms is UKBIM which is a Twitter community that openly shares BIM experience with practical on the job utilisation of the software. Mobile phone applications such as Buildcalc and Sitemate are excellent examples of how Quantity Surveyors can utilise social media for fast and accurate recording of measurements on site and direct input into cost reports. This technical evolution has accelerated accurate communication for Quantity Surveyors and such analytical clarity lessens time otherwise wasted on assessment of claims and disputes on projects.

Hislop argues that difficulties with knowledge sharing through ICT should not be underestimated. "Many of the social cues that allow clear communication such as tone, pace of voice, gesture and expressions are invariably lost or downgraded when people communicate solely via ICTs. Developing and sustaining trust between parties may be difficult if they have never met and rely solely on ICTs." (Hislop, *op cit.*, p.146).

Research has confirmed that occasional face to face meetings are paramount for trust building if virtual teams are to successfully work together (Kauppila *et al.*, *op cit.*). To allow deep understanding and trust to develop from an early stage, dispersed teams should communicate with enthusiasm and show a willingness to engage. If the virtual teams give timely responses from the outset, this may create a more personal and social relationship than would otherwise be the case. (Jarvenpaa and Leidner, 1999).

KPMG International (2019) carried out a global construction survey to assess whether the construction and engineering industries were prepared for future challenges. Part of their findings related to the 'human touch gaining hold'. The survey discovered that despite the acknowledged influence of automation and robotics, humans remained the heart and soul of projects. Of the survey respondents, 46 percent declared that people were the most important factor in delivering projects, against 28 percent who said that technology was the most important factor and 26 percent

for process and governance. Industry leaders expressed concerns that the next generation did not fully grasp the fundamentals of project delivery, but they did not think that this challenge could be solved by technology alone. The suggestion arising from the survey was to train the next generation in both technical and non-technical soft-skills and increase investment in the technological capabilities of newer recruits with guidance from more experienced workers. This guidance could be in the many formats discussed later in this thesis.

2.3.5 Artificial Intelligence

The 21st century has witnessed an increase in robotic technology carrying out repetitive work in many sectors. In 2017, Andy Haldane (2017), then chief executive with the Bank of England, declared that robotic technology could threaten 15 million jobs in Britain. He said that it was the more menial jobs that were under most threat of replacement by artificial intelligence (AI). Countries such as Japan, where one quarter of their population exceed 65 years of age need to source new ways of doing manual tasks that were previously done by humans. Examples of artificial intelligence replacing tacit operations are:

- Drug manufacturing: laboratory testing. The repetitive machine testing presents analyses for tacit consideration by experienced staff.
- Agriculture and Farming: feeding livestock using drone technology to take feed to isolated locations.
- Banking: facial recognition at ATMs. Banks in China have experimented with non-card transactions.
- Fast food industry: automated ordering process at bars and restaurants to increase efficiency.
- Domestic chores: automated grass cutting, window cleaning and vacuuming floors.
- Motoring: driverless cars are progressing with advanced technology.
- Online shopping: replacing High Street visitations and cash flow.

All these examples will eventually lead to human job losses where machines replace people. In Germany 30 percent of the economy is motor industry related. As a result, changes to electric vehicles or more efficient and reliable public transport may have a significant negative effect on the German economy.

In France, plans for the Paris Olympic Games in 2024 include the aspiration that all public transport in central Paris will be driverless. All these changes have knock-on effects. For example, less cars on the road may mean less accidents, less hospital A&E requirements, but a smaller insurance

premium income pool may increase costs substantially. However, tacit knowledge and human contact will still be required in many areas such as nursing, HR and education (O'Neill, 2018).

Artificial intelligence has had multiple impact on the construction industry. Examples include innovative virtual building modelling. This system can retain design data from the initial process for use throughout the design process. Other examples include the MEP design elements such as lighting, temperature and heating controls where data is retained and controlled from external sources for managed buildings. This has become very popular in both commercial and residential buildings. Integrating AI and Building Information Modelling (BIM) allows designers to amend and consider changes in construction projects. These changes may enhance building performance, buildability and 'clash detection' in design.

Quantity Surveyors are at the heart of this technology change. Working with designers and engineers, they have been able to develop integrated software that allows access via BIM for project cost control. They can monitor and track cost implications for design change, create up to date cost analyses and cost control procedures for their clients. Other examples for surveyors include the use of drone technology to survey roofs, high level and inaccessible structures. The use of such technology provides assurance and, ultimately, cost certainty, for their clients.

2.4 Individual and organisational knowledge management

2.4.1 Defining knowledge management

“There is no generally accepted definition for knowledge management (KM). Most practitioners and professionals concur that KM treats both tacit and explicit knowledge with the objective of adding value to the organisation.” (Dalkir, 2011, p.26). KM is essentially about getting the “right knowledge to the right people at the right time” (Mathis and Jackson, 2008). Kransdorff (2012) explains that decision making is not a reflex skill and generally consists of lessons learned derived from prior experience. There are occasions when this process may be a dress rehearsal for well thought out and analysed decision making.

Four examples of knowledge management definitions in the published literature in specific contexts are as follows:

From a cognitive or knowledge science aspect: *Knowledge* – the insights, understandings, and practical know-how that we all possess - is the fundamental resource that allows us to function intelligently. Over time, considerable knowledge is also transformed to other manifestations – such as books, technology, practices, and traditions within organisations of all kinds and in society in

general. These transformations result in accumulated expertise and, when used appropriately, increased effectiveness. Knowledge is one, if not the, principal factor that makes personal, organisational, and societal intelligent behaviour possible (Wiig, 1993).

From a knowledge asset or intellectual perspective: *Knowledge management* - consists of “leveraging intellectual assets to enhance organisational performance.” (Stankosky, 2008, pp.9-10). According to Rigby, “knowledge management develops systems and processes to acquire and share intellectual assets. It increases the generation of useful, actionable, and meaningful information, and seeks to increase both individual and team learning. In addition, it can maximise the value of an organisation’s intellectual base across diverse functions and disparate locations. ‘Knowledge management’ maintains that successful businesses are a collection not of products but of distinctive knowledge bases. This intellectual capital is the key that will give the company a competitive advantage with its targeted customers. Knowledge management seeks to accumulate intellectual capital that will create unique core competencies and lead to superior results.” (Rigby, 2011, p.32).

From a general management perspective: *Knowledge management* is a “collaborative and integrated approach to the creation, capture, organisation, access, and use of an enterprise’s intellectual assets” (Grey, 1996). According to Brooking (1999, p.154), “Knowledge management is the process by which we manage human centred assets... the function of knowledge management is to guard and grow knowledge owned by individuals, and where possible, transfer the asset into a form where it can be more readily shared by other employees in the company.”

From a technology perspective: *Knowledge management* is the concept under which information is turned into actionable knowledge and made available effortlessly in a usable form to the people who can apply it. (Patel and Harty, 1998). It can also be described as a systematic approach to managing the use of information to provide a continuous flow of knowledge to the right people at the right time enabling efficient and effective decision making in their everyday business. (Dalkir, *op cit.*). A knowledge management system is a virtual repository for relevant information that is critical to tasks performed daily by organisational knowledge workers.

Other knowledge management definitions include:

“A capability to create, enhance, and share intellectual capital across the organisation - a shorthand covering all the things that must be put into place, for example, processes, systems, culture, and roles to build and enhance this capability.” (Lank, 1997, p.406).

“The creation and subsequent management of an environment that encourages knowledge to be created, shared, learned, enhanced, organised and utilised for the benefit of the organisation and its customers.” (Abell and Oxbrow, 2001, p.267).

Knowledge management is a dynamic process of creating knowledge, identifying sources of this new knowledge and the elicitation and distribution of this new knowledge (McInerney, 2002). “The use of knowledge management in non-profit organisations such as libraries can improve communication among staff and between top management and can promote a culture of sharing.” (Teng and Hawamdeh, 2002, p.188).

In the author’s opinion, managing knowledge in the construction industry is an amalgam of all the above definitions. Construction knowledge management encompasses knowledge by action. It should be systematic, and it makes use of IT repositories for sourcing products, technology and people.

2.4.2 Knowledge workers

In 1959 Peter Drucker coined the phrase ‘knowledge work’ and suggested that this quality talent would promote organisational productivity in the 20th century. “Creative knowledge workers use a combination of creative applications to perform their functions/roles in the knowledge economy, including anticipatory imagination, problem solving, problem seeking, generating ideas and aesthetic sensibilities” (Loo, 2017, p.138). Examples of knowledge workers in the construction industry are architects, engineers and Quantity Surveyors. According to Bogdaniwicz and Bailey (2002, pp.127-9), “new knowledge workers value lifelong learning over lifelong employment. Knowledge workers need to work in a supportive environment to cultivate and create new knowledge, as can be evidenced in organisations such as innovation design teams and practices.”

The title ‘knowledge worker’ may appear vague and subjective. Hislop (2013) pointed out that, depending on their occupation type, knowledge workers carry out knowledge-intensive work. Furthermore, using Giddens’s (1979) belief that all occupations including professionals exhibit a self-reflexive and monitoring process, they can therefore be deemed knowledgeable. Hislop’s definition of a knowledge worker is “anyone whose work involves the use of a reasonable amount of tacit and contextual and/or abstract conceptual knowledge” (Hislop, 2013, p.73). Hislop commented further that a key aspect of a worker involved in knowledge-intensive activity is that it is not typically boring, repetitive or routine work. It may frequently be the opposite; bespoke and customised for specific activities or clients. Hislop also argues that knowledge workers are the

ideal employees insofar as their willingness to devote their time, energy and effort to their work. They are usually easily motivated and welcome a challenge.

Alvesson (2000) believes that there are four reasons why knowledge workers make such efforts.

1. They find their work intrinsically interesting and fulfilling.
2. Such working patterns represent the norms within the communities they are a part of.
3. A sense of reciprocity, whereby they provide the organisation with their efforts in return for good pay and working conditions.
4. Such behaviour reinforces and confirms their sense of identity as a knowledge worker, where challenging work is regarded as a fundamental component.

Knowledge-intensive organisations are not the same as normal hierarchical organisational structures as the potential for conflict or dispute is less. In knowledge-intensive organisations, worker and management boundaries tend to evolve over time, and therefore the interests of employers and employees are more likely to be shared (Robertson *et al.*, 2003).

Most managers, when faced with a new challenge, may approach the task using tools they are already familiar with. Those tools tend to be of a technological nature. However, as the nature of this challenge is much more about the interrelationship of content, context and the people who put the pieces together, it is inevitable that technology will not always be enough. “If technology solves the problem then it was probably not a knowledge problem in the first place” (Ruggles, 1998, p.88). Ruggles further explains that “following a four-year observation period of knowledge management problems, the solutions were found in the following proportions 50:25:25 of people, process, and technology respectively. Therefore, if the people managing the process and technology are not informed, their organisation may flounder and fail. The knowledge solution must therefore lie with the people, knowledge transfer and training.”

Preparing students effectively in the 21st century for a digital age, information and knowledge-based economy requires creativity and innovation. Students must prepare creatively for the workforce as many eventual roles and responsibilities may not exist at the point of commencing employment. Wooten (2013) suggested that “teachers need to become modern knowledge workers who embrace this level of education and adopt a more unconventional approach to thinking and creating than their predecessors”.

Figure 2.4 describes the numerous traits that relate to knowledge workers. “Teachers today need to become lifelong learners in an information society where information constantly flows freely, is instant and infinite.” (Wesch, 2009, p.69).



Figure 2.4 The portrait of a Knowledge Worker (le Borgne, 2012)

For this to occur, teachers and students alike need to develop strategies for engaging with, working with and constructing new knowledge, or as Wesch describes, “moving from being just knowledgeable to knowledge-able”.

2.4.3 Managing tacit and explicit knowledge

Polanyi proffered that the value of acknowledging tacit knowledge stems from the reality that all knowledge consists of issues we cannot easily explain: “we can know more than we can tell” (Polanyi, 1966, p.4). “The troublesome aspect of tacit or implied knowledge is that it tends to be elusive for three reasons: (i) we are not fully aware of it, (ii) there is no personal need to make it explicit and (iii) there is a potential risk of losing power and competitive advantage by making it explicit” (Stenmark, 1999). A more contentious distinction made between tacit and explicit knowledge is that tacit knowledge is implied with clear expression and is largely intuitive, silent

or unvoiced, while explicit knowledge is clearly defined leaving nothing implied and can be found in specifications, rules and procedures (Hilbreth and Kimble, 2002).

The valuable tacit knowledge base built up within any organisation could be shared by individuals in a central pool of specific knowledge. This agglomeration of information and data would therefore enhance the professional dynamic of the organisation. Sharing of information is essential if a team is to advance in a meaningful way. We are all limited by our personal capacities (Mitchell, 2006). All knowledge, even that derived from rules, relies on personal judgement (Polanyi, 1958).

“For Nonaka (1995) tacit and explicit knowledge are complementary entities and interact with one another in the creative activities of human beings.” (Hislop, 2013, p.26). Hislop asserts that knowledge management and more specifically knowledge sharing can be viewed from an objectivist perspective (See Table 2.3).

KNOWLEDGE MANAGEMENT: OBJECTIVIST PERSPECTIVE
Convert tacit to explicit knowledge (codification)
Collect knowledge in central repository
Structure/Systemise knowledge into discrete categories
Information and communication technologies play a key role

Table 2.3 Objectivist Perspective on Knowledge Management (Hislop, 2013)

In the conversion of tacit to implicit knowledge, the tacit knowledge must first be converted to explicit knowledge. Hislop gives an example of a car assembly line where workers are following written or online instructions. These instructions invariably started off as tacit and had to be converted to being explicit for sharing purposes. A process was probably achieved allowing and encouraging knowledge workers to articulate their actions and converting these tacit actions into codifiable explicit instructions. The second phase is for management to decipher what knowledge is important, restructure this into a systematic process and select a repository to allow easy accessibility for other knowledge workers. Third, senior management must use its discretion to customise this information to determine its usefulness to the overall knowledge base of the organisation. Knowledge management (KM) process systems could then analyse and customise this valuable knowledge into useful categories for later use and consumption by fellow workers. The accessibility platform may be electronically cross-referenced for easy use and the conduit or

mechanism allows extraction of knowledge from a central repository through an intranet or search engine (Hislop, *op cit.*).

Davenport and Prusak (1998, p.70) observed that “tacit knowledge incorporates so much accrued and embedded learning that its rules may be impossible to separate in the process that determines how an individual may act”. Organisational management needs to recognise the location and source of this embedded knowledge. The task for managers is to implement a sustained process of acknowledging this tacit knowledge wealth from on-boarding through to the retirement of the knowledge worker. “Effective KM requires an organisation to identify, generate, acquire, diffuse and capture the benefits of knowledge that provide a strategic advantage to that organisation.” (Dalkir, *op cit.*, p.31).

KM is the layer occupied by senior management largely dealing with intangibles. “Risk management, customer relationship management, quality management, brand management and safety management also deal with intangibles. The implementation programmes for dealing with these disciplines can also provide a model for dealing with organisational KM. For example, managing risk or safety in an organisation is about prioritising these disciplines so that the behaviours of people within the organisation can change and be sustained in a positive way. This is what is required with KM and individual employees should be encouraged to follow a proven implementation path such as is emphasised in risk and safety programmes.” (Milton and Lambe, 2016, p.8). In the author’s experience the kernel of risk management for quantity surveying and cost control is experience. Having had the opportunity of working on similar projects in the past, this experience of hindsight and lessons learned involves a high degree of tacitness.

2.4.4 Prioritising knowledge management

A survey carried out by Knoco Ltd (2014) asked international knowledge managers to prioritise the methods they deemed most effective from a list of eleven knowledge management approaches.

Milton and Lambe (*op cit.*, p.9) suggest “using the six core components as a discussion basis with organisation managers, to rank the components to their individual priority choice, relevant to each department or organisation”. By doing so, they suggest that this will encourage the further discussion of important aspects of knowledge management requirements for the organisation. This survey is referred to later in this thesis as a supporting ‘argument seeking candidate participation’ in mentoring workshops for MTP.

This discussion should avoid using knowledge management terms and managers should be encouraged to translate the six core terms into business language pertinent to their personal needs and understanding. One such suggestion was to use three different headings to assist this translation process. “The idea was that this would give a clearer understanding of knowledge requirements using business language in relation to co-ordination, memory and learning.” (Milton and Lambe, *op cit.*, p.10).

Table 2.4 shows prioritising elements of Knowledge Management.

KNOWLEDGE MANAGEMENT ELEMENT	RESPONDENTS (%) JUDGING THIS ELEMENT AS HIGHEST PRIORITY
Connecting people through communities and networks	22.2%
Learning from experience	17%
Improved access to documents (inc. search and portals)	15.3%
Knowledge retention	13.5%
Creation and provision of best practices	9.4%
Innovation	8.7%
Improved management of documents	4.8%
Training and development	3.1%
Accessing external knowledge and intelligence	2.5%
Knowledge-based engineering	2.5%
Big data	1%

Table 2.4 Survey result showing priority given to different elements of knowledge management (Knoco Ltd., 2014)

Milton and Lambe’s headings are set out and detailed below.

Coordination: Discuss how the different parts of the organisation should coordinate their business activities, maintain their shared objectives, avoid making mistakes and keep track of their common goals for the organisation. These tasks include collaboration, such as communities of practice, effective communication between organisation components plus document and information management.

Memory: Establishing good record keeping of critical decisions, plans and activities and ensuring accessibility by all associated staff members. Maintain a standard of

capability by addressing the risk and loss of critical knowledge from the organisation.

Learning: The organisation needs to learn and change internally to adjust to changes in the market that happen externally. These issues include speeding up the organisation's learning; building-in continuous improvement to each department, standardisation of approaches across the organisation to ensure best practice, collecting and analysing information and striving to develop new innovative products and services.

Some organisations or communities may be in a constant state of flux or change for either internal or external reasons: "getting everybody on the same page at the same time is a never-ending battle" (Kmetz, 2012, p.13). When projects are small in scale it may be easier to activate change to meet market requirements. A small team can discuss a problem, suggest solutions and enact new processes to elicit progressive change. When projects are larger in scale the situation becomes far more complex. More people and activities are involved, perhaps over a longer period and sharing knowledge and processing information becomes more difficult. Business environments and market requirements rarely remain static. To adjust to these disturbances and shocks requires organisational resilience. This resilience may rely heavily on the internal tacit knowledge of the organisation and its individuals. This could allow the organisation to meet market requirements, including regulatory demands. To master these tasks requires an intrinsic knowledge base, and a willingness to learn and change in order to retain market competitiveness and ensure long-term survival (Kmetz, *op cit.*).

This element of research explored how knowledge, both tacit and explicit, can be created and managed in an individual and organisational manner. The next step is to explore how this acquired knowledge asset can be efficiently transferred in a sustainable process.

2.5 Knowledge transfer and potential lost opportunity

2.5.1 Knowledge transfer generally

Subject matter experts leaving their organisations could take with them tacit knowledge which may be undocumented and possibly irreplaceable. Leonard *et al.* state that the large number of baby-boomer (people born between 1946 and 1964) retirements has created an urgent need for the transfer of their knowledge to the next generation. There are also layoffs, successions and promotions which may result in a scarcity of subject matter proficiency (Leonard *et al.*, 2015). Leonard also points out that much will depend on the criticality of the knowledge and experience

lost in the event of a key employee leaving the organisation. “When employees walk out the door, they take valuable organisational knowledge with them... the most knowledgeable employees often leave first” (Lesser and Prusak, 2001, p.1).

Some QS practices, particularly larger organisations with the benefit of long-term projects, may be in a better position to address succession planning. Medium and smaller quantity surveying practices may not have made provision for this. As a professional approaches retirement from an organisation, the soon to be lost tacit knowledge and know-how, amassed over a working lifetime, requires a plan or programme to capture it. If this is not done, this learning cannot benefit younger less experienced staff. Individual and organisational knowledge may exist in an ‘experience repertoire’. Some experiences occur frequently, and others may be rare, but management needs to capture these experiences to ensure they are passed on.

Leonard maintains that professions such as medicine and law are better than many other, newer, professions at recording and documenting these experiences through journals and published papers. These eventually become codified as common practice (Leonard, 2011). Experienced staff or organisational experts can make decisions swiftly, can prioritise and put things into context, are capable of making fine distinctions and often know when rules may not apply. Experts need less time and information to make decisions than novices. Their reactions are often based on pattern recognition and intuition. This allows them deal professionally with a problem or issue (Leonard and Swap, 2005).

“The challenge facing many organisations is not only the loss of an experienced employee. It is also that many of these professionals and managers take with them critical expertise and experiential knowledge. This knowledge may not have existed a generation ago.” (DeLong, 2004, p.10). It is important for managers to ascertain critical knowledge requirements and to establish the level of damage this loss could inflict on the organisation.

Dalkir (*op cit.*) suggests a three-tiered approach to value-based knowledge management:

Tier 1: For the individual or employee

- a. Helps people, saves time by better decision-making and problem-solving.
- b. Grows an organisational “community bond”.
- c. Helps keep everyone updated.
- d. Proposes challenges and opportunities to get involved.

Tier 2: For the group or community

- a. Grows professional skills.
- b. Encourages peer mentoring.
- c. Enables increasingly effective teamwork and networking.
- d. Matures a 'professional code of ethics' for individuals to follow.
- e. Foster a shared language.

Tier 3: For the organisation

- a. Assists with the delivery of strategy.
- b. Rapidly resolves issues
- c. Circulates 'best practice'
- d. Enhances knowledge held both in services and products.
- e. Improves openings for innovation and cross-pollinates ideas.
- f. Empowers organisations to be better at staying ahead of competitors.
- g. Develops organisational 'memory'.

These tiers are explicitly included in the design of the mentored tutelage programme which forms the basis of the research part of this thesis.

The knowledge manager can then consider the value and validity of the loss effect should the knowledge leave any of these three tiers (Dalkir, *op cit.*). The intellectual asset value of critical knowledge can then be identified for retention purposes. This way, the storage, ease of retrieval and re-use of legacy knowledge can be identified and managed for the future (Stewart, 1997). The author cautions that Stewart is correct only if senior management can actually identify the critical knowledge that must be retained and stored. Senior management often move onto other duties and may lose contact with technology and compliances. This often becomes the expertise and domain of the junior knowledge worker.

Stemke (2012) advises that the onus should be on the retiring professional to achieve handover well in advance of leaving the organisation and suggests the following three steps:

Step 1: Source your successor; support him or her in preparation for taking over on your retirement.

Step 2: Seek mentoring opportunities especially for challenging projects.

Step 3: Share your techniques for problem solving and how to deal with complex tasks.

Before considering how critical knowledge is transferred, one should consider what critical types are available for transfer. Leonard *et al.* (2014) suggest this critical knowledge should be

categorised into three different knowledge types (explicit, implicit and tacit) and analysed as set out below.

Explicit: documented in some textual, visual or auditory form; can be provided by the expert without much, if any additional verbal explanation.

Implicit: not documented or embedded in processes but can be articulated by the expert in rules, steps, stages or techniques.

Tacit: never articulated in the past but can be explained by experts through processes such as smart questioning.

In the experience of the author, construction projects are rarely identical. The ‘build type’ and completed result may be significantly different but the people, processes and management of the construction knowledge is often similar. Pathirage *et al.* (2007) investigated the relevancy of tacit knowledge in construction organisations to realise specific industry benefits. This study found that architects, engineers and surveyors considered the transfer of tacit knowledge for construction projects to be a very complex operation. One suggested solution was the development of a framework based on the concept of a “smart space for learning within an organisation” (Dolog *et al.*, 2008, p.1). This repository framework would enhance tacit learning for individuals and ensure this knowledge was captured and stored for the benefit of the organisation.

2.5.2 Motivating knowledge workers to share

Organisational knowledge workers may require motivation to participate in a knowledge sharing process. Those who possess this, at times valuable, knowledge need to show a willingness to share their hard-earned tacit knowledge. An example of this was when an Indian software company agreed to take part in a knowledge sharing initiative which subsequently failed. Lam (2005) produced an analysis of the reasons for failure of this initiative. He concluded that due to the individualistic nature of the company the staff were inhibited from both sharing and receiving knowledge. Further research has shown that employees who possess tacit knowledge may only share their knowledge if they part with it voluntarily (Holste and Fields, 2010). A decision to either share or hoard activity-based tacit knowledge is often a dilemma faced by employees. They must consider the positive and/or negative outcomes carefully before sharing or hoarding (Fahey *et al.*, 2007). Hislop (*op cit.*) examined several case studies where organisational change was inhibited due to a lack of cooperation with fellow employees to impart tacit knowledge owing to a history of employees vying for favour within the organisation.

Knowledge creation is a highly internal set of cognitive activities involving observation, thought, and reflection. Individuals need time and facilitating work environments to engage in knowledge creation. However, knowledge sharing, and knowledge application are aspects of managing knowledge that manifest themselves externally as behaviours. Knowledge sharing with others may stimulate the knowledge creation practices by focal individuals and their co-workers. This can be viewed as another episode of knowledge creation. Similarly, applying knowledge may also stimulate knowledge creation practices. Knowledge workers often work individually or in groups. They may accomplish various tasks as individuals on a works application or work in groups by sharing their ideas with a community of practice to complete a task. The exact mix of time spent by individuals creating and individually applying new ideas versus sharing ideas with others before application may depend upon whether the individual has all the resources that are needed or whether collective action is required to try out the new idea (Shahnawaz *et al.*, 2008).

According to Seidman and McCauley (2005), information, data and innovative ideas are ubiquitous in a knowledge economy. Hoarding such valuable and often critical knowledge are pointless and traditional leadership models are a paradigm of the past. Collaboration and connection of new insights must be encouraged by management.

Knowledge transfer can be emotional, exhausting and, often, time-consuming. It may develop into an uncertain process (Hislop, *op cit.*). Holste and Fields (2010) researched the part played by trust in the knowledge transfer process. They concluded that when it came to tacit knowledge sharing, employee's faith in the proficiency of their peers became the most fundamental issue. In the author's opinion this transfer does not have to be emotional, exhausting and time consuming if handled correctly by senior management. If both the transferor and recipient of such valuable and pertinent knowledge are treated with respect and the process is communicated correctly, both should see the benefits of such actions.

Table 2.5 highlights three types of trust.

Companion-based trust appears the strongest for the purposes of knowledge sharing. This form is based on goodwill and generosity between work colleagues. Competence based trust relates to how competent the person is in their ability to ultimately carry out the newly learned task. Lastly, commitment-based trust relates to contractual trust where a party commits to carrying out a task under a contractual agreement (Hislop, *op cit.*, p.156).

TYPES	DESCRIPTION OF TRUST
Companion	Trust based on judgement of goodwill or friendship, built up over time
Competence	Trust based on perception of others' competence to carry out relevant tasks
Commitment	Trust stemming from contractual obligations

Table 2.5 Newell and Swan's Three Types of Trust (Hislop, 2009)

Since the middle of the last century the growth of cognitivist science or the notion of 'human knowledge' has been popularised by Chomsky, Minsky and McCarthy, where reality and truth hold privileged positions and where truth is the degree to which inner representations correspond to the outer world (von Krogh and Roos, 1995). Economists believe that trust is associated not with moral expectations but with costs. Hence it is argued that a 'trusting environment' is a pure strategic outcome, not a norm based on moral reasoning (Huemer, 1997).

2.5.3 Knowledge transfer – theories and frameworks

Eraut (2004) suggested there were five stages of knowledge transfer "in which relevant knowledge is identified, the new situation is appraised... and appropriate knowledge identified as relevant is transformed to fit the current situation" (Eraut, 2004, p.12). Becoming an expert is not dependent upon declarative knowledge, but on experiential knowledge, including an understanding of current practice and how your own work relates to the wider practice of the discipline (Shreeve and Smith, 2012).

According to Buchel (2007), the difficulty in managing knowledge transfer techniques is due to the tacit nature of the specific knowledge context within the organisation. It is widely accepted that knowledge creation and retention is the kernel of innovation required for an organisation to develop competitive advantage. Buchel points out that the problematic nature of transferring newly created knowledge is particularly evident when bringing new products to market. Such developments may be multi-functional and may include a myriad of tacit knowledge transfer. The challenge for the management team is to agree a mandate to combine all creative facts and ideas with the eventual goal of producing a new competitive product for the market. Tacit knowledge may be embedded in all development stages from conceiving, designing and delivering the product to the market. This process can be compared to the construction and property sector where time, cost, and quality are closely monitored at each stage in the process. To support innovation, efficient knowledge flow in development teams will frequently face two levels of problems, (i) those affecting the team and

(ii) those affecting the relationship between the team and other functions both inside and outside the organisation (Dougherty and Hardy, 1996). The organisation must manage relations and functions both internally and externally. An additional challenge frequently overlooked is supplier input. This helps to ensure that a product development can respond to the demands of the customer and the market.

Other research has shown that transfer of knowledge can depend on cultural team relationships and willingness to share and trust. Examples such as joint venture projects between two firms have shown that the transfer of tacit knowledge and ultimately the alliance success commenced with the perception of interpersonal relationships and trustworthiness of the contracted partners (Leonard, 2015).

Existing literature has many examples of the iterative learning and knowledge cycles (See Figure 2.5). There are also many examples of the learning and knowledge content of each elicitation node of the cycle. All such cycles define the various stages of the learning process. Cycles may represent both explicit and tacit knowledge transfer and suggested stages may include “knowledge creation and construction, knowledge articulation, knowledge repository updating, knowledge access, knowledge use and knowledge revision” (Rowley, 2001, p.227).

The transfer of tacit knowledge has the potential to be a foundation for continual competitive advantage. This knowledge lacks codification and cannot be appropriated by competitors (Ranucci, 2015). Knowledge in an organisation may not be specifically in one departmental area or sector. It may be throughout the organisation. A realisation must exist that should this knowledge cease to exist, either through retirement or a knowledge expert leaving, the organisation needs to have a back-up plan if it wishes to exist in a competitive market. It is the duty of the managers to define how crucial the potential of lost knowledge would be. It could be divulged to a competitor or cease to be available through retirement. The rarity of this expertise and the possibility of replacement can then be viewed in a tangible manner.

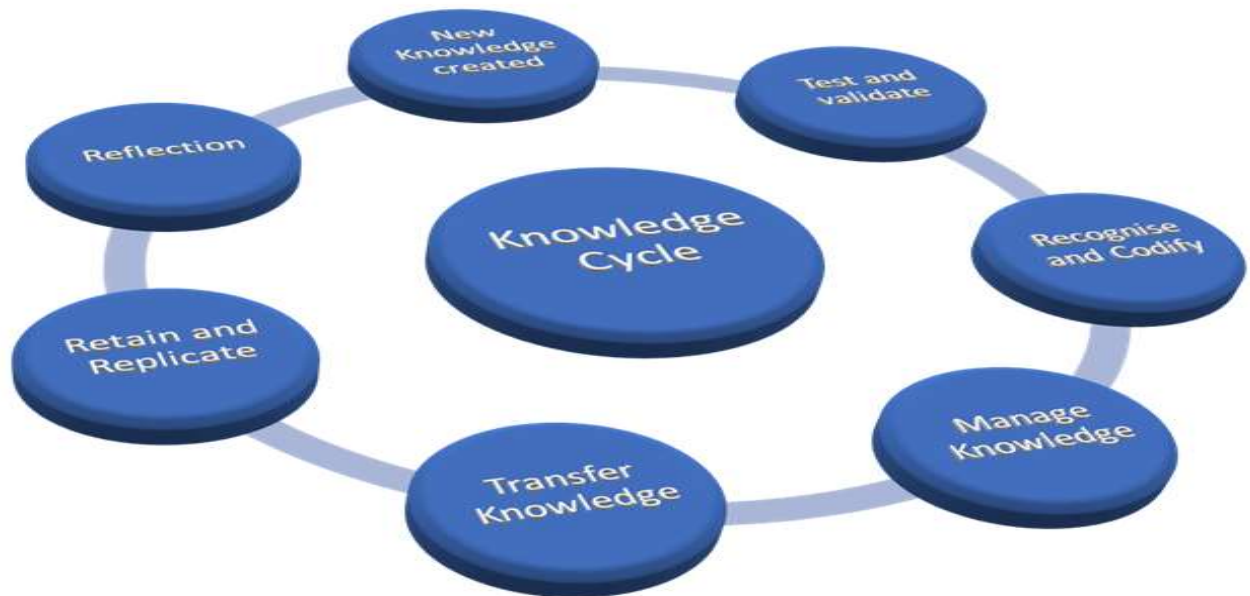


Figure 2.5 Knowledge Cycle (Boylan, 2018)

Buchel suggests that if we are to comprehend the design and organisational capabilities required to advance new concepts, the process is best approached through the lens of social capital, defined as “the value that results from the intangible resources found in personal relationships” (Buchel, 2007, p.46). Individuals, teams and organisations all contain social capital which is largely based on the nature of social networking and social networks. Social networking, using web management tools to encourage web-site chat rooms, discussion boards, bulletin boards and other similar forums, requires healthy and sustained dialogue if the users are to gain useful knowledge worthy of transfer (Hung and Der-Chang, 2001). On-line chat rooms and discussion forums may be too primitive to manage the complexity of intense interaction and dynamism usually evident in face-to-face meetings. The knowledge recipients or learners must acquire a lens for identifying useful information, data and knowledge. This process is like traditional apprenticeships where the acquisition of traits, norms and rules are held by the communities of practice (Hung, 2001). Hung argues that knowledge lies less with databases and more with the interaction of people and communities of practice. He considers that it should be encouraged with a structured dependency, using e-learning as a support tool.

Interpersonal networking has proved to be a valuable tool for transferring tacit knowledge beneficial to innovation and worthy of transfer. An individual, working within an organisation, without these social network connections may be in a weaker position and may therefore be less effective in information flow. The cultivation of useful information through social networking will allow the organisation to benefit from a larger knowledge base and increase the team’s social

capital. In order to disseminate knowledge, the team requires interfacing devices or tools with access to recognised and approved repositories. The key to successful knowledge creation and transfer involves investment of resources in sharing actions and decisions. But this investment must be conducted with cost-benefit analysis and support.

Enterprise Ireland and Knowledge Transfer Ireland (KTI) are two state-funded bodies who share a mission to help industry find, connect, and engage with benefit from publicly funded Irish research. This collaboration commenced in 2013 with a web portal of tools and guides for knowledge transfer support for innovative companies. KTI created 119 new spin-off companies in 2016 alone and up to 2019 were responsible for creating over 1,000 new jobs for industry.

2.5.4 Sourced research similarities to this research

This section describes and analyses seven academic research studies with similarities to this research. Their time frame spans from 2011 to 2018. The purpose of including these research studies was to investigate how other researchers had dealt with tacit knowledge transfer issues and how Action Research was applied to some of these research topics.

The studies were as follows.

1. An Investigation into the “Stickiness” of Tacit Knowledge Transfer (Alison Murray and Philomena Hanlon, 2015).
2. A New Framework for Defining, Identifying and Explicating Tacit Knowledge: Qualitative Research using Aspectual Analysis on SMEs (Alex Gachuhi Kimani, 2017).
3. An Investigation into the Tacit Knowledge Transfer Process in an Open Plan Office Environment (Caroline Bernie, 2015).
4. Strategic Planning in Irish Quantity Surveying Practices (Róisín Murphy, 2011).
5. Strategies to Retain Tacit Knowledge from Baby Boomers (Rhonda Jean Corvin, 2015).
6. A study of agile project management methods used for IT implementation projects in small and medium sized enterprises (Daniel Glen O’Sheedy, 2012).
7. The Development of Ambidexterity as a Key Dynamic Capability for ECO- Innovation in SMEs: An Action Research Study (Margaret Tallott, 2018).

Appendix 2.1 includes the title, author, date, brief description of research and noted similarities.

2.5.5 Examples of knowledge transfer methods

Social learning is an example of knowledge transfer which may occur through casual conversation, supervised conversation, webinars, coaching and mentoring and instruments such as social media. If encouraged and implemented correctly, it can provide employees with access to employment or career queries which otherwise may not occur. Collaboration is key to social learning.

“The ‘social’ dimension is not a new phenomenon. Similar collaborative knowledge sharing systems have been deployed by knowledge management groups for more than twenty years. One lesson learned by knowledge management practitioners is that technology alone does not inspire long-term activity or create measurable business value. Two other ingredients are critical: context and behaviours. To be effective, a social learning implementation needs to be organised into multiple contexts aligned with skills, competencies or processes. With clear boundaries, learners understand where to seek or share information, and who might be able to answer questions” (Stemke Consulting Group, 2012, <http://www.transferknowhow.com/blog/>).

A good example of social learning is communities of practice (COP) where knowledge is shared and transferred. Professional bodies such as SCSI and RICS have developed such forums for COP to work effectively through CPD and workshop discussions. It allows members a platform for discussion plus new insights for members who may not have exposure to such knowledge.

“Social technology is clearly an important enabler. However, effective knowledge transfer processes and reinforced seeking and sharing behaviours are also critical for delivering a learning experience that creates a competitive performance advantage for an organisation” (Stemke Consulting Group, *op cit.*).

Calixto’s (2012) advice was to keep the knowledge transfer programme simple and to ensure that all stakeholders are not intimidated by an intricate high-level programme.

Calixto’s five key steps to devise a workable programme are as follows.

1. Study the organisation’s demographic to determine areas of risk due to impact of attrition on various disciplines.
2. The mentor should be sourced in agreement with all stakeholders.
3. Establish staff competency levels.
4. Set up knowledge transfer activities in agreement with employer and employee.
5. Set up measurable goals for the programme.

This programme structure will be discussed in greater detail in later chapters.

The author concurs with the inclusion of the five stages but would add four essential inclusions:

1. The learner(s) must be willing, enthused and energised to accept this new knowledge.
2. The learner(s) should be interviewed in advance of a KM programme to agree the choice of mentor and the method proposed to measure the goals on completion of the programme.
3. The learner(s) need to have access to the mentor for any follow up queries which the learner may have on reflection of the learning activities.
4. There needs to be an assurance of confidentiality between mentor and mentee.

Examples of researched knowledge transfer methods include instructional scaffolding, communities of practice and situated learning.

2.5.5.1 Instructional scaffolding

Jerome Bruner, a cognitive psychologist, is credited with the theory of instructional scaffolding. Bruner's theory emanated from Lev Vygotsky, a Soviet Belarussian psychologist who considered that a learner can initiate a process which can be supported by a knowledgeable peer or instructor. This theory was later developed to prove how higher mental functions, developed through cultural mediation and interpersonal communication can represent a shared knowledge of culture which he coined 'internalisation' (Vygotsky, 1978). Several educators and psychologists further developed these theories such as the pedagogical stage of peer support for a student (Ellis and Worthington, 1994). Other studies have shown how learners can obtain a new understanding by analysing their already achieved knowledge and presenting this through the support of capable individuals (Raymond, 2000). The 'fading' process is activated by the teacher to encourage the learner's development to avoid boredom, help the learner fit in and observe the learner achieving his or her goals. The scaffolding is removed gradually. The positive aspects of instructional scaffolding are that it delivers efficiency, engages and motivates the learner and minimises the level of frustration for the learner (Pinatoan, 2013).

The author questions the generality of the concept as there is no assurance of the timeline between each phase. Other similar studies show how a writing tutor can engage the student's attention and confidence, calibrate a task, motivate the learner, identify relevant features, control frustration and demonstrate what is ultimately needed to advance the student's knowledge and capability (Rogers, 2004). Figure 2.6 illustrates how a newly qualified graduate who commences employment could have a structured support via an appointed tutor and how this structured support or scaffolding would gradually fade away as a mentoring programme progresses.

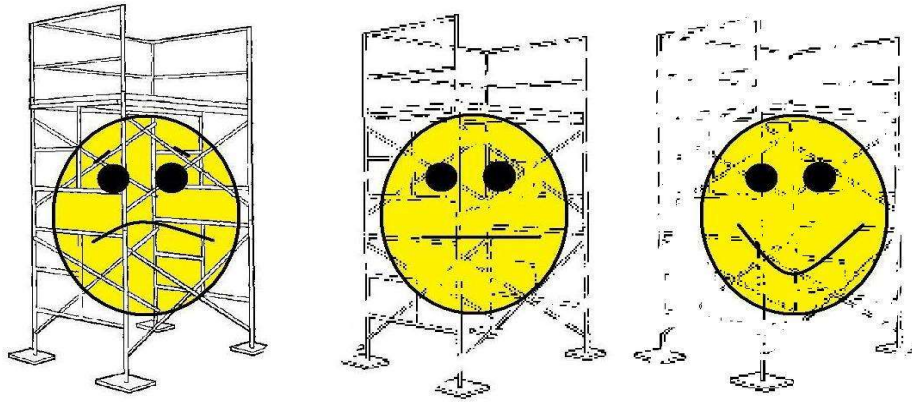


Figure 2.6 Instructional Scaffolding (Boylan, 2014)

Scaffolding may be used in several ways in a classroom forum. The teacher may break down a complicated task into smaller steps, tap into previously known material, provide the setting for new material while relating it to existing information. The teacher may also prototype a task before requesting students to execute it and suggest clues to discovery of the solution to a problem or ask questions to stimulate better approaches and thinking.

The concept of ‘reciprocal scaffolding’ was promoted by Holton and Thomas (2001). It is a cooperative approach where two or more people can mutually learn (‘two-way peer tutoring’). Interaction with peers requires competence and experience in asking appropriate questions of themselves and each other. “Others think that doing so actually impedes the process, particularly in terms of higher thinking.” (Holton and Clarke, 2006, p.127). The author concurs with the above comments regarding peer-to-peer tutoring but cautions that the environment must be conducive to transfer of such knowledge. A typical example would be where a junior Quantity Surveyor trades IT skills for tacit knowledge from an experienced surveyor within the organisation where both benefit in a mutual trust environment.

According to Lajoie, four factors are often pointed to as being critical to success in scaffolding. These are (i) well-defined content (outcomes), (ii) appropriate level of structure, (iii) appropriate time to build and (iv) remove the scaffold (Lajoie, 2005). The tutor’s capacity to use these factors appears to have significant impact on the scaffold’s success.

2.5.5.2 Communities of Practice

A community of practice may become the organisational vehicle to implement creative change. This could be achieved via workshops and/or dialogue to consider how employees with complementary skills can become more inclusive and productive. According to Raelin (2008), a COP team with common goals and purpose may find workable solutions for organisational

implementation. They should focus on individual and team capability more so than explicit problem solving.

The COP team may be formed by people who share common beliefs and values. Initially they may not have a specific agenda but share a willingness to address a flexible working agenda. Raelin also believes that COP may take many forms such as subtle cues, recognised hunches, intense verbal give and take, rules of thumb, stories and shared worldviews.

Wenger (1998) believes that there are three parameters that set out conditions necessary for a COP (Raelin, *op cit.*).

- (1) Mutual engagement: participants are there to make a change. It is not a matter of social conditioning as participants must become engaged in meaningful actions.
- (2) Joint enterprise: through negotiation and dialogue participants must find a way to be both accountable and willing to work together.
- (3) Shared repertoire: participants agree on the manner in which they share the action and how they establish stories and gestures to symbolise their shared practice.

In the author's view, Ireland's construction and property industries should look at other industries and disciplines to evaluate useful programmes and practices. One such framework example could be the communities of practice programme in the Canadian Healthcare Programme. While Canada is constantly lauded for having one of the best national healthcare programmes in the world, a report by Lefebvre, Brault, Levert, Roy, Proulx, Alarie and Lariviere was published on "co-developing a knowledge exchange network to facilitate access to clinical best practices during care transitions of patients with chronic diseases; an example in oncology" (Lefebvre *et al.*, 2015, pp.43-44). The kernel of the article presents a review of 'patients as partners' and the changes the participants made to the clinical care and process for patients. The study included planning of the patient care continuum, the professionals speaking to each other about the individual patients, rules for discharging patients and optimising the transitions between different levels of care. It highlighted the main problems arising during execution of a knowledge exchange strategy aimed at enhancing clinical oncology care. Using experience and good practices such as mentoring, the participants developed an informal network of persons who shared their passion and experience in an informal network or community of practice. Lefebvre *et al.* judge that the Canadian model is an excellent example of how lateral thinking with mentoring techniques can create and enhance better care and support for all participative stakeholders.

Prax (2015) said that communities of practice are based on a flow of knowledge and they constitute an ideal forum for collective intelligence, innovation, creation and collective knowledge. According to Wenger, a community of practice is essential for organisations in an increasingly knowledge-based economy. Communities of practice are a strategic path to developing and sharing tacit knowledge and are vital tools in the knowledge economy (Wenger, 1998). The mentors of this community maintain relationships with one another, participate in activities over time and develop relationships with other communities of practice (Gheradi *et al.*, 1998). The forum for a community of practice can be workshops, mentoring or coaching groups, video conferencing, email, or other social media channels. The community could be a problem-solving forum which could lead to 'knowledge through sharing'. Community mentors share knowledge, establish common group practices, and are not covetous with their knowledge. They aim to promote a common professional goal to exchange, share and learn from each other. According to Wenger communities of practice are built on three principles: (i) mutual commitment, (ii) a common undertaking and (iii) a shared inventory of resources that allows members to communicate and solve problems. Thus, learning occurs through intellectual process on the one hand and membership and active participation in the interactions that occur on the other (Wenger, *op cit.*).

Wenger asserts that favourable conditions for the creation and optimisation of these Communities of Practice must be present to promote their development. The conditions are:

1. Organisational support and managers.
2. Effective project management.
3. Support for training.
4. Effective organisation of the community.

The author concurs with Wenger's four conditions but would add that it is essential to have 'willing learners' participating in the COP and prior agreement of the relevancy of the topic of knowledge to be discussed and transferred. Matos describes COP as a space for co-development where members can exchange knowledge in order to improve their practice. "Communities of practice are often seen as a strategic pathway to develop and share tacit knowledge and are vital tools for the knowledge economy" (Matos, 2016, p.45).

Sometimes practices can extend beyond their communities to latch on to other communities by creating different networks of interactions linked by interconnected fields (Lefebvre *et al.*, *op cit.*). Wenger asserts that "communities of practice are groups of people who share a concern, a set of

problems or a passion about a topic, and who deepen their in-depth knowledge and expertise in this area by interacting on an ongoing basis” (Wenger *et al.*, 2002, p.4). COPs have existed from prehistoric times when cavemen drew hieroglyphics and drawings on cave walls to depict methods of hunting and survival. Thousands of cavemen died on freezing cave floors from the cold not realising that in some circumstances they lay on coal, the very source of heat that would have saved them (O’Dell *et al.*, *op cit.*). Knowledge transfer is like this scenario, that graduates or staff in an organisation may long for knowledge when it is obvious and within the organisation that employs them. For COPs to flourish in an organisation they often depend on “the voluntary engagement of their members, and on the emergence of internal leadership. Moreover, their ability to steward knowledge as a living process depends on some measure of informality and autonomy” (Wenger *et al.*, *op cit.*, p. 12). COPs need to be integrated into the organisation giving them a voice in decisions and legitimacy within the management process.

2.5.5.3 Situated learning

“Situated learning contributes to a growing body of research in human sciences that explores the situated character of human understanding and communication. It focuses on the relationship between the learner and the social situations in which the learning occurs.” (Lave and Wenger, 2011, p.14).

Many examples of situated learning are available, including apprenticeship, military training, nursing, sports and music disciplines. In the context of adult education and graduate mentoring, a more defined structure could be applied for an in-house training programme, the forum for which may be *in-situ* or in selected locations away from the work environment. This flexibility allows the students the opportunity to express themselves in a more relaxed environment, where dialogue may flow more easily. Lave and Wenger suggest that “learning should occur in an ambient community and the place of knowledge is within the community of practice. Questions of learning must be addressed within the development cycles of that community and this forum may become a diagnostic tool for the betterment of the learners involved.” Lave and Wenger (*op cit.*, p.100). Newcomers can then participate in a community of practitioners as well as a productive activity. In this way learners are transformed into practitioners whose newly acquired knowledge, skill and discourse gives them a developing identity and allows them to become members of a community of practice.

In *situated learning*, “instead of regarding learning theories as discordant, it is proposed that human cognition is complex and there is a role for behaviourist, cognitivist, constructivist and social

constructivist models of learning based on the objectives and context of learning” (Hung, 2010, p.281-7). When learning is problem based, Lave and Wenger (*op cit.*) suggest that the student learns by socialisation, visualisation and imitation. Solutions are found by exploring real life situations to find an answer to a problem. Hung also agrees with this view and concludes “that taking a problem-based learning approach to designing a curriculum carries students to a higher level of thinking.” (Hung, *op cit.*, p.281-7)

2.5.5.4 Tacit knowledge support instrument

The Myers Briggs Type Indicator MBTI was developed to assist and support the tacit knowledge of identifying different types of personality. The indicator is an internationally recognised instrument developed by Isabel Myers and her mother Katherine Briggs in 1940 (Myers and Briggs, 1940). It provides a guide questionnaire to read an individual’s personality type. This may become valuable in dealing with client negotiations or seeking strength and support from a project team. HR managers may use the MBTI to determine who in the organisation is skilled in certain areas or who may possess capabilities for critical roles in a project.

Four key personality types are highlighted in Figure 2.7.

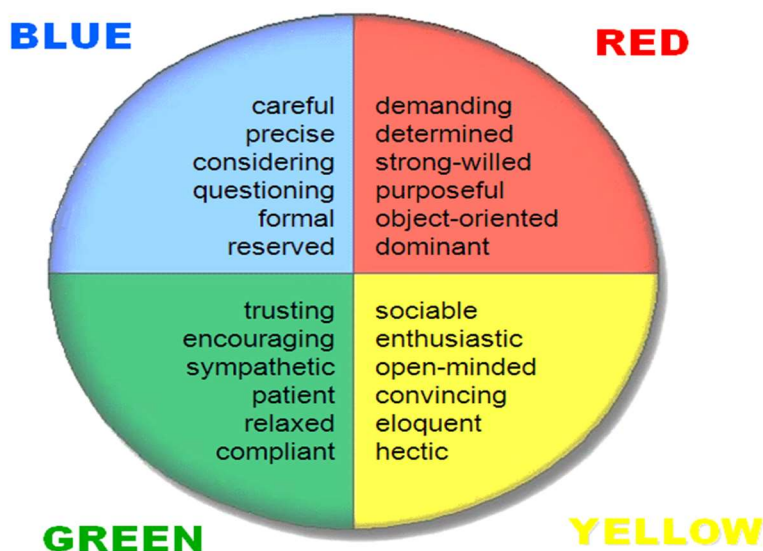


Figure 2.7 Four Personality Types (Myers and Briggs, 1940)

Blue: cautious, analytical, formal, apprehensive and reserved. Quantitative individuals such as engineers and Quantity Surveyors may fit into this category.

Red: competitive, purposeful, strong minded, aggressive, overbearing and often intolerant. In general, perhaps, contractors or developers may fit into this category.

Yellow: expressive, sociable, informal, frantic, indiscreet and hasty. Generally creative designers such as architects may fit into this category.

Green: amicable, reliable, caring and docile. Generally back room and support staff may fit into this category.

2.5.6 Obstacles to knowledge sharing and transfer

According to Leonard (2014), managers charged with the responsibility of knowledge-transfer initiatives are commonly referred to as ‘change managers’. It is their talent and ability to recognise obstacles to knowledge-sharing that will result in the success or otherwise of the change process. If employer and employee share the ideal of a unified corporate mission, then a successful knowledge transfer programme may provide an envied legacy for future generations. But first, barriers must be recognised, addressed and removed.

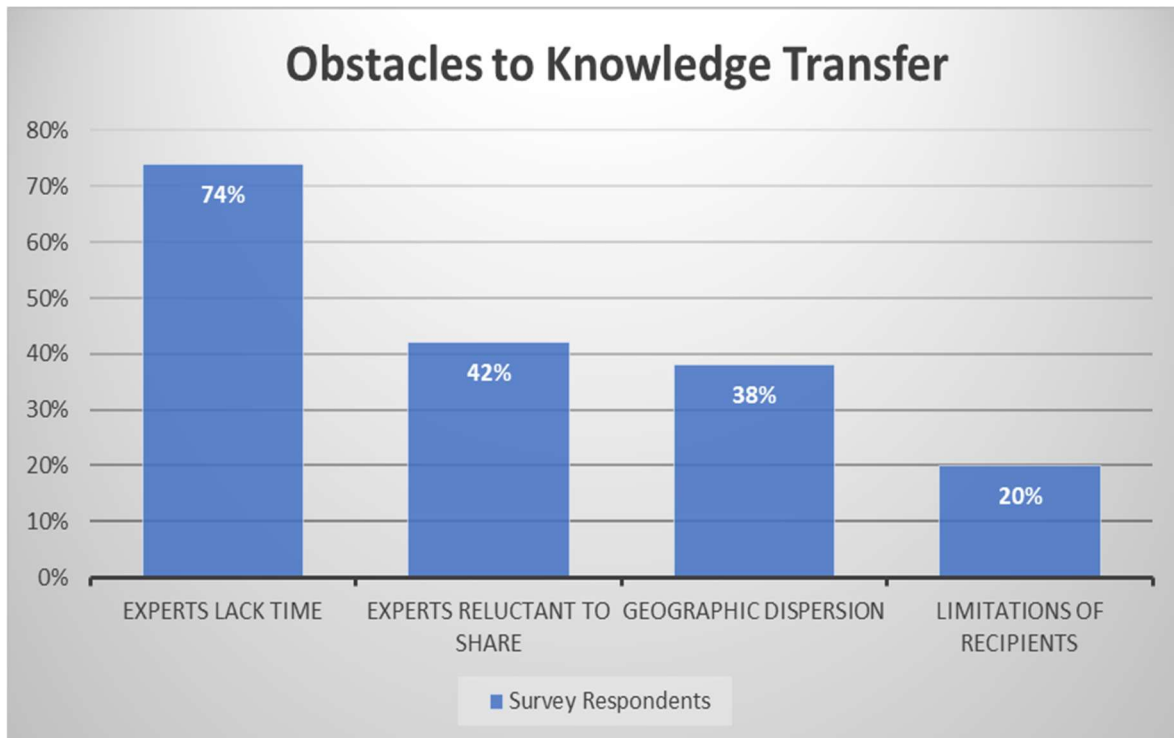


Figure 2.8 Obstacles to Knowledge Transfer (Leonard et al., 2014)

Leonard (2015) analyses these four parts of the survey (See Figure 2.8) as follows:

(1) Experts' lack of available time.

The survey showed that the lack of available time to mentor was by far the most popular reason for non-transfer of tacit knowledge.

According to Leonard this is a perennial problem. There are many suggestions to address this obstacle such as change managers insisting on weekly meetings allowing junior management the opportunity to probe seniors on special skills to carry out specific critical activities. Another solution is off-loading elements of the senior's workload to facilitate juniors becoming familiar with more senior operations.

(2) *Experts' reluctance to share*

Senior managers possessing critical tacit knowledge may feel under no obligation to share their hard-earned knowledge. Research has shown that should mentoring be required from the possessor of this critical knowledge then they should be reimbursed. Financial incentives are the tried and tested solution to encourage and enable the handover of critical tacit knowledge.

(3) *Geographical Dispersion*

Bi-location and different geographically located personnel sharing critical tacit knowledge is common in the commercial world. Electronic ICTs offer a solution for successful tacit knowledge transfer via modern forms of communication. Alternatively, occasional meetings or periodic communities of practice sessions can be used.

(4) *Limitations of recipients*

There may be an inability or unwillingness by some junior management to learn from their seniors. It is the remit of both senior and junior managers to first identify what the learner can do to develop the basic methods required to successfully receive this knowledge. It may be critical for organisation owners or directors to match the expert and learner in the first place. Generational problems and processes are discussed in this chapter. Leonard describes the procedure as "the grey beard dispensing pearls of wisdom to a young acolyte" (Leonard *et al.*, 2015, pp.195-220). Millennials (those born in the last quarter of the 20th century), bring a different mind-set to the workplace than the generation X and baby-boomer predecessors (born between 1946 and 1964). Suggested solutions include flexible working hours for millennials, teaching and socialising opportunities for experts and learners and senior management recognising and utilising millennial skills.

2.5.7 Asking questions to find solutions

From early in life, children are often discouraged from constantly asking questions. However, an organisation's adaptability in an ever-changing environment may depend on management's support and their willingness to make it a learning organisation. "The ability to ask questions goes

hand in hand with the ability to learn. Therefore, a learning organisation may only survive if it has a culture that encourages learning.” (Marquardt, 2014, p.13).

Questions are still asked today regarding the design, construction, and operation of the Titanic and why and how 1,500 lives were lost. Communications from other vessels in the area advising of icebergs should have been heeded and the tragedy may have been avoided. Finkelstein (2004) is of the opinion that companies who do not support questioning are “zombie companies”. He believes that these companies “have created an insulated culture that systematically excludes any information that could contradict its reigning picture of reality”. People are often afraid to ask what they may perceive as inept or stupid questions. They often fail to realise that these questions can be very useful, can unlock conversation and may even open up dialogue not otherwise considered (Marquardt, *op cit.*, p.21).

Michael Dell, founder of Dell Computers, believes “asking lots of questions opens new doors to new ideas which ultimately contributes to your competitive edge” (Tichy, 2002, p.61). Dell also encouraged a questioning climate in which employees felt safe and in which they have trust and faith in the forum and people involved. If employees feel vulnerable, a richness of questioning will not prevail. Leaders should encourage free flow of information and establish an inquiry culture to build a sustainable learning platform (Marquardt, *op cit.*). Reg Revans (City of Manchester University, Action Learning guru) asserted that great questions are fresh questions coming from conditions of ignorance, risk and confusion where nobody knows what to do next. They are generally raised at a time when it generates the strongest amount of reflection and learning.

Marquardt citing Heifetz and Laurie (1997) maintained that there are two types of organisational problems: technical problems and adaptive problems. The former may be described as a problem which can be resolved by turning to a set of procedures in a documented format. The latter are problems to which there are no ‘off the shelf’ solutions. The knowledge to fix such problems involves questioning, individual and team reflection and learning from the occurrence. The organisational leader is faced with the task of mobilising personnel to address possibly painful decisions, changing attitudes or even culture. This has to be done in conjunction with learning something new from the process and at the same time creating knowledge that did not exist before (Marquardt, *op cit.*). Questioning therefore may not always be required but can be a great motivator to push human beings to think differently and to explore alternative techniques previously untapped. Relevance and use of fresh questions to solve organisational problems may lead to clarity and consensus. As Marquardt points out, if the wrong question is processed then the organisation

may jump to solutions too soon and solve the wrong problem. For healthy and open creative problem-solving, questions can often challenge organisational perspectives and allow all participants the luxury of viewing the ‘big picture’ or what some managers may call the ‘helicopter view’ of the problem. This also affords the opportunity for participants to see beyond the problem and may provide new insights for the entire team’s contribution for the betterment of the process and ultimately the organisation.

Open forum debate could allow healthy and positive deliberation to promote organisational improvement. According to Leonard, a healthy organisation should encourage knowledge transfer and remove any obstacles to it. But first, these barriers should be recognised before trying to remove them.

The author concurs with Marquardt and Leonard but questions the importance of pertinent questions and how to monitor and control the level of questioning. In the quantity surveying context, areas of expertise such as measurement or BIM operation have established ‘frequently asked questions’ for interns and juniors to become accustomed to methods and protocol. This pre-established checklist provides the learner with an operation guide and allows the learner to advance and only raise the ‘infrequently asked questions’.

2.5.8 Questions, accountability and change

Questions can build a culture of accountability and foster commitment through participation in open forum workshops and debate. A questioning culture also develops self-confidence, openness and flexibility. Leadership may become more empathetic and more in tune with employees. Questioning skills may become honed with experience if they are to lead to positive change. In an interview with Time Magazine in 2006, Eric Schmidt, former CEO of Google, stated that “we run this company by questions not by answers”. Peter Drucker, a management and leadership expert for over half a century, discovered that the effective leaders he had met and worked with, behaved in a very similar way. They started out by asking, “what needs to be done?” Then they asked, “what can I do, and should I do it to make a difference?” They constantly asked, “What are the organisation’s missions and goals? What constitutes performance and results in this organisation?” They were not afraid of strengths in their associates. They also asked, “What in my organisation could I do that would truly make a difference?” and finally. “How can I truly set an example?” (Drucker and Maciariello, 2004, p.367).

There is a joy in listening to children asking questions “why don’t the clouds fall? or “if a snail loses its shell is it naked or homeless?” Children’s questioning is usually a barrage set both to test and to seek information. In business, questions may be asked not to result in defensive answers but, instead, to poke or prod at how situations may be improved or how issues may be resolved.

‘Change management’ is often a mantra or battle cry for consultants. However, when change occurs in an organisation people may find it threatening and often people’s lives become unstuck (Bertels and Savage, 1998). When markets and their requirements change, organisations need to adapt to constant change. Their task is to approach this change using common sense and to focus on the road ahead with organisational coherence. All this activity must be carried out, while remaining competitive and retaining market share.

Before, during or after change has taken place, staff and middle management may not have had the opportunity to question why the change occurred. It can be justifiably argued that staff dealing with the day-to-day organisational issues should be part of the decision to instigate and implement change.

Marquardt notes that in a fast-paced, results-oriented world (he was writing in 2014), information is available at our fingertips often nanoseconds away. Leaders are therefore expected to be bold, decisive, visionary and charismatic and at times knowing the answers before others have thought of the questions (Marquardt, *op cit.*). Confucius (479 BC), as a preparatory ritual in advance of speaking, set out and slowly straightened his floor mat to allow himself think and set the atmosphere for those he was addressing. This is similar to setting the dinner table each evening as a ritual. It creates an environment for all to enter in a more relaxed mode. Such methods allow participants to position themselves, create an atmosphere of trust and phrase their statements so that highly charged debates do not break down into ‘shouting matches’: Confucius (Book 10 of Analects).

One could and should learn the discipline of how to pose questions; to stop, listen and speak in ways that open up a space for engagement and progression instead of defensiveness and rigidity. It is important to act civilly and thereby relate better to one another (Puett and Gross-Loh, 2016). Research and experience have shown that it is wise to exercise restraint and cultivate your propriety to control emotions and develop a successful engagement.

According to Marquardt (*op cit.*), if an employee is posing questions to a group or management personnel similar preparedness applies. This preparedness can be set out as:

1. Stay calm and be professional.
2. Avoid becoming emotional.
3. Still yourself and breathe.
4. Read the dynamics of the room and get a sense of all in attendance *i.e.*, some engaged, some bored, some aggressive, some distracted and some empathetic.
5. Avoid the big questions first.
6. Build up to them with minor questions to set the scene.
7. Read body language such as gestures, frowns, smiles, and yawns.
8. Be prepared to change tack and move to Plan B in order to reach the same goal of your questioning.
9. Lead by following – the rest of the group is not to know that.

Organisational management must ensure sustainable resources to guide projects through from initiation to compliant handover. In tandem with this function is determination to seek excellence in every element of the organisation, equality of motivation and motivation to build upon this capital to create new opportunities for the entire organisation when market change occurs.

Additionally, Marquardt (*op cit.*) sets out some guidelines to asking a successful and meaningful question. He suggests that before asking an important question, the management of an organisation or an individual must set the scene for posing the question and prepare the environment and the forum. These guidelines include:

- Timing - await the opportunity.
- Break the ice - is this a good time?
- Frame the question - to cover all pre-thought-out responses.
- Listen carefully - show full attention and interest.
- Grateful - always be grateful for the participants' time and response. Then go away and reflect!

In the author's opinion and in projects generally, managers must understand the criticality of effective communication. We assume we are communicating within a comparable set of shared goals, expectations and competencies. These preconceptions enable us to both implicitly and explicitly discard content that we, as managers, assume is common knowledge. Managers of organisations must decipher what tacit knowledge is both transferrable and worthy of retention for future use. Only tacit knowledge that has a truly effective value to the organisation should be retained. Managers bearing ongoing responsibility throughout a project cycle must be aware of the

added risk of unconsciously miscommunicating information. This could be to the detriment of the team and the project.

“Employees working as team players can possess an array of knowledge, wisdom, creativity, and energy. Organisational managers and leaders can best access this wealth of experience and empower their people by encouraging questions as a natural part of team discussions.” (Marquardt, *op cit.*, p.45). “Creativity requires asking questions for which an answer is not already known. Truth is that innovation is rarely the product of pure inspiration, that eureka moment when some genius comes up with a wholly new idea. Rather, innovation happens when people see things differently.” (Marquardt, *op cit.*, p.47).

Innovation may be generated by great questions in an environment that encourages questions. Questions can, in their turn, prompt risk-taking, and risk-taking has often led to significant ideas. For every step forward, someone had to wonder whether a current situation could be changed or made better. Questions needed to be asked, such as what could happen if I did this? Is there any other way to think about this? What possibilities exist that I haven't thought of yet? (Marquardt, *op cit.*).

Mentors and coaches also use questioning as an appraisal and monitoring tool. Suggestions for questioning (Trautman, 2013) are:

- Before a learning or knowledge transfer session: outline the session in advance; be aware of individuals’ qualifications and abilities; be familiar with individual candidates.
- During the session; carry out stage by stage questioning “are you with me so far?” “can you please read me back your notes on a specific area?”
- At completion stage of the session: summarise the session; request a synopsis from everyone; “what did you get from the session?”
- Finally, after the session: issue appropriate feedback to ensure that the candidates received a monitored response from the session.

Insofar as asking questions of management is concerned, this requires purpose and focus. One should emerge with a possible solution after the process. Posed questions may have a ripple effect on management but this is preferential to the ‘hand-grenade effect’ which may have a calamitous result (Raelin, 2018). This questioning approach was raised during the questionnaire and open forum debate discussed later in this research. It later formed a basis for discussion comment in the MTP workshops.

Francesca Gino of Harvard Business School highlighted the inquisitiveness of employees and how this adds value to organisations and how such high levels of curiosity can help build networks and create new knowledge (HBR, 2019). Edgar Schein of MIT believes training can expand the range and frequency of the questions that employees can ask. He expanded his belief that questions are the secret to productive working relationships, but they must be driven by genuine interest in understanding another point of view (Schein, 2013).

When an individual in a work-based scenario asks a question of a senior colleague, an element of trust commences in their working relationship. The individual asking a question may expose a vulnerability that may be taken advantage of or ignored. Trust may also be displayed by the person being questioned to express interest and to pay attention to why the individual is asking this question. This trust process is interactive where both individuals get something in return for their invested inquiry and response (Schein, *op cit.*).

2.5.9 Knowledge transfer support and other professions

Professional services organisations such as chartered Quantity Surveyors or surveying departments within construction companies are heavily dependent on the skills and know-how of the individuals within the organisation. For organisations to deliver a strategic performance and prosper in a competitive market they require identification and support of tacit knowledge. Team performance can benefit for the sharing of knowledge and experience which in turn develops trust between team participants (Johnson, Johnson and Smith, 2007). Hansen, Nohria and Tierney, (1999) studied several IT organisations and found that successful managers used both codification and personalisation to promote tacit knowledge, as opposed to storing this knowledge in repositories. Codification in IT is where a stored knowledge database is codified for retrieval later. Personalisation centres on individual knowledge shared between employees (Hansen *et al.*, *op cit.*). It can be argued that an organisation's approach to tacit knowledge management should encourage a symbiotic strategy. This involves the creation of knowledge contexts for replication within the confines of the organisation so that external competitors may find it difficult to copy unique and tacit know-how (Jasimuddin, Connell and Klein, 2005). Construction professionals including Quantity Surveyors may learn from other professions about how best to manage and transfer tacit knowledge for the betterment of both the organisation and the individual.

2.5.10 Tacit knowledge in the legal profession

Legal interpretation can depend on the tacit knowledge of the lawyer and case success may depend on the *ad hoc* nature and experience of the legal practitioner's competence. Building an argument

is often more important than knowing the legal statutes and regulations (Marchant and Robinson, 1993). When a client employs a lawyer as his expert in law to prosecute or defend a case, he may not necessarily require a law expert, one who understands legal statutes, precedence and regulations. Primarily he wants someone to win the case for him. The true advocate must have the capability of being able to define and interpret these statutes and regulations. No matter how codified the law is, it is open to interpretation and is used by lawyers to support or argue against an individual's case.

Graduate lawyers may have many action-plan frameworks to assess, interpret and act in a legal action.

One such mnemonic is ILAC:

Identify the problem (what is the basis of the case fundamentals and legal argument).

Law or legislation (research similar legal actions searching for precedence).

Apply the preceding case law to your individual case or action.

Conclude with best legal advice for your client.

Each of these four actions above requires competency, experience and interpretation by the practitioner. Marchant and Robinson (*op cit.*) argue that knowing case law and relevant statutes only forms part of the practitioner's weaponry or arsenal at their disposal. Successful conclusion relies on creative legal reasoning and the ability to weave arguments that favourably support your client's case. The adversarial nature and complexity of the legal system often means the advocate is primarily focused on winning the case at all costs. This distracts from a search for alternative solutions and possible outcomes. Therefore, the tacit nature of the legal profession has significant implications for a lawyer's education and training.

Senior managers in a legal practice are charged with the job of appointing an individual lawyer to a specific case. Should that choice be successful the practitioner then builds on that experiential learning. Feedback and peer-review are frequently used mechanisms to ensure that the novice lawyer receives full support and training within the practice. Due to the tacit nature of the profession the teaching of legal practitioners should focus more on inductive than deductive skills (Marchant and Robinson, *op cit.*).

To build and defend a legal case the experienced practitioner is called upon to exercise analogical reasoning. This may be defined as the making of predictions and diagnoses in any set of situations

that require novel problem solutions (Gick and Holyoak, 1983). Legal reasoning is frequently required where the application of legal precedence is unclear. The courts will follow previously decided cases for guidance and direction known as *stare decisis*, hence the legal practitioner must use their tacit knowledge skills to build legal argument to convince the court of their client's case. To develop the tacit competence, the practitioners must use (i) experiential learning, (ii) knowledge gained from mentors and (iii) observation of the legal system in action. Student practitioners must therefore acquire tacit knowledge in a more deliberate way (Marchant and Robinson, *op cit.*). In the legal profession, in the developed world, the greatest example of tacit knowledge eventually becoming explicit, is the law of precedent in contract law, where judicial decisions may have a bearing on swaying the outcome of the case.

Tacit knowledge transfer (TKT) by observing legal precedent can prevent errors occurring and, more importantly, being repeated. In European judiciary, many judges have observed that knowledge sharing is not a new phenomenon. TKT may occur through meetings, seminars, symposiums and bespoke learning events. These conducive environments encourage the tabling of new policies in defiance of outdated and possibly dysfunctional practice (Ferretti and Afonso, 2017). In the Republic of Ireland, the legal profession is well represented by the Law Society and the Bar Council. Monthly law journals and periodicals serve as a valuable platform for debate and information when case precedent and case law are updated by legislation. Training seminars and workshops also feature as support for solicitors and barristers.

2.5.11 Tacit knowledge in the United States military

On completion of a survey of US military management personnel, Horvath *et al.* (1994) state that, in their experience, tacit knowledge is acquired through personal experience more than instruction from military superiors. They believe that tacit knowledge is encoded originally in episodic rather than semantic memory, although later this knowledge becomes stored through the process of compilation or reflection. They claim tacit knowledge has three characteristic features:

1. It is intimately related to action.
2. It relates to goals that people value.
3. It is usually acquired with little help from others.

The military tacit knowledge survey focused on three different levels within the US Military, firstly at platoon level, secondly at company level and lastly at battalion level.

At platoon level, leaders generally have a minimum of 1 to 3 years' experience and are responsible for supervising 25 to 45 much more experienced personnel. The tacit experiences that became evident through interviews with platoon leaders related to the challenge of motivating more experienced subordinates. These platoon leaders are mostly young men and women endeavouring to gain a foothold in this large military organisation. Hence, tacit knowledge about managing oneself in terms of credibility and acceptability was more evident at this level than higher levels. At company level, the more experienced leaders are responsible for 120 to 200 soldiers. They can also administer punishment to personnel at this level including withholding pay on disciplined soldiers. When directing and supervising others, their tacit knowledge demonstrated more discretion. Company commanders used their tacit skills to balance their mission accomplishments with that of their subordinate's requirements. Finally, the battalion leaders, who manage 500 to 700 soldiers and must have military experience of 16 to 20 years, enjoy considerable power and discretion in discharging the legal authority of command. Their tacit knowledge related to protecting the organisation and managing organisational change. Battalion commanders had learned to use indirect communication methods as opposed to face to face methods employed at the lower levels (Horvath *et al.*, *op cit.*). The mix of traditional military values and individual managers is unique. Ulmer (1998), espoused that it sustains attention to obligations, provides the gall to attack at night, over unwelcome terrain and perpetuates a relentless can-do attitude that wins wars.

In the military profession, changes in technology and weaponry may lead to new experiences for the soldier on the battlefield and this practical 'hands-on knowledge' may develop by experience to become explicit knowledge in military training.

2.5.12 Tacit knowledge in the medical profession

In the medical profession, explicit and tacit knowledge are often referred to as scientific and artistic medicine respectively. "Scientific medicine" relates to the laboratory results and encompasses biomedical sciences such as anatomy, radiology, physiology, pathology and medical physics. The artistic element of medicine relates to experience, intuition and a holistic solution to ensure patient care in a more humane manner. In explicit medicine, the physician uses deductive analysis of the patient's symptoms to yield a diagnostic solution. In tacit medicine, the physician relies on assumptions, biases and alternative methods before considering a diagnosis (Patel, Arocha and Zhang 2012).

Patel *et al.* (*op cit.*) provide further examples of dynamic decision-making in situations such as the medical intensive care unit (ICU). The goal of the ICU is to receive, treat and stabilise the patient in the quickest possible timeframe. This management process involves the coordination of many departments and experts are led by a single team leader. If the patient's medical condition changes or deteriorates the medical team's goals continually shift requiring reactionary response from the team and its leader. As society evolves, patient care requirements also change, requiring continuous reappraisal by using explicit and tacit knowledge solutions for improved medical care (Dunbar, 1993). Being an expert medical practitioner involves more than making the right diagnosis and knowing the correct treatment. Simply asking the patient a question regarding their symptoms to make a judgement is not enough. The practitioner must observe the way the answer is delivered before a judgement is possible. In making a diagnosis the physician may apply causal reasoning in a conscious effort to consider and/or discard a diagnosis based on a sequence of hypotheses and deductions. He must deviate from standard medical practice solutions to tailor a successful solution and diagnosis for the individual patient (Sternberg and Horvath, 1999).

The medical profession has developed over centuries where trial and error in all aspects of medicine from treatments to operating techniques are clear examples of tacit knowledge becoming explicit and part of the medical graduate's explicit training. One such example is simulation where the environment is similar to real surgery. In 2018, the National Surgical Skills Centre of the Royal College of Surgeons Ireland (RCSI) in Dublin completed a simulation facility to cater for training postgraduates, surgical trainees and specialist trainees, such as fire brigade emergency training units. Interactions are filmed then critiqued and centrally documented so that students can correct errors and observe their improvement over time. This is the first simulation facility built outside America and is modelled on centres in Boston and Harvard. According to Professor Fergal Malone of RCSI, Dublin "access to cutting edge simulation is extremely significant in surgical training such as obstetrics and gynaecology, as this speciality you cannot learn from a book" (Malone, 2017, p.15).

2.5.13 Tacit knowledge in other professions

Chris Argyris argues that tacit knowledge in the management of large organisations is the primary basis for both good effective management and occasionally for poor management deterioration. The primary basis for effective management is to define and transform, as much as possible, the behaviour required to achieve the organisation's objectives into routines that work (Argyris, 1993). Gaps in organisational ability, highlighted or replicated by lack of tacit knowledge may also

become threatening to both the individual and eventually the organisation itself. For example, if a superior believes a subordinate's performance is below standard and if he tells him in an open and forthright manner, then the subordinate may become defensive. This could be counter-productive and stifle progressive change. Where this problem between the superior and the subordinate remains unresolved, Argyris uses the term 'skilled incompetence'. Too heavy a reliance on tacit knowledge can hinder a business when it tries to mask itself as logic or being rational and may correlate with causation. Finding a solution to managerial problems is a two-part process: first, using clear explicit guidelines and, second, using the individual's tacit intuition. The whole point is to get both processes to concur (Hastopoulos, 1999).

Law enforcement and the security services have become a highly sophisticated area due to the growing threat of terrorism and organised crime. Embedded tacit knowledge in police forces such as Ireland's *An Garda Síochána*, is paramount to solving crime and maintaining law and order in any country. Succession planning in the force includes phased retirement of personnel with critical knowledge. Imparting the compendium of knowledge that a police officer accrues over a lifetime of fighting crime is part of this process. Other professions could take a lead from how *An Garda Síochána* deal with the transfer of tacit knowledge in areas such as preparation for court hearings, dealing with cross-examination, contributions to intelligence units such as the Criminal Assets Bureau (CAB) and dealing with fraudulent documentation and behaviour. All such activities are catered for by in-house mentoring programmes and one-to-one coaching assignments. Internationally police forces transfer intelligence through Interpol and Europol. This sharing of intelligence is a good example of how like-minded organisations with similar goals can benefit from tacit knowledge transfer.

Another example of managing tacit knowledge come from the film industry. If the same individuals are working together on successive films, then the collective tacit knowledge developed through shared experiences could yield many benefits. This collaborative and complementary knowledge base may speed up the decision-making process and the film production in general (Ebberts and Wijnberg, 2009).

Tacit knowledge has many uses and applications in other professions. One unusual example is adventure tourism. This trend in tourism has grown significantly in the past 30 years where tourists rely heavily on the local tacit knowledge of guides to ensure a safe and enjoyable vacation. A study by Buckley and Ollenburg explored the uses and advantages of tacit knowledge in activities such as trekking, mountaineering, bird watching, rafting and kayaking. The study concentrated on the

wilderness exploration of South America, Africa, Siberia and Eastern China. In these places the lack of tacit knowledge may greatly increase the risk factor and wilderness survival. This use of tacit knowledge transfer opportunities provides considerable local knowledge advantage for visiting tourists. It also provides financial support for indigenous guides (Buckley and Ollenburg, 2013).

Davenport and Prusak (1998) maintain that the best way to transfer tacit knowledge is for an organisation to hire bright young people and let them talk to each other. They cite the example of Pratt and Whitney Rocketdyne, the aerospace engineers who faced the challenge of losing half their experienced workforce through retirement by 2007. In the late 1990s they considered how to convert their valuable tacit knowledge into codified explicit knowledge. Their normal working environment did not allow sufficient time in the working day for this process to happen. So, they created a 'mentor circle' of twelve people. The mentor circle met once a month to share the various programmes they were working on and how they dealt with issues such as project challenges and customer problems. The circle comprised exclusively of programme managers who would not have had the opportunity to meet in normal work circumstances. The circle was chaired by a senior programme manager and its main purpose was to eliminate the repetition of the mistakes their predecessors had made. The circle was so successful that the theme was expanded to include such issues as women in leadership, engineering challenges and product development. According to the participants the ground rules evolved as the circle evolved and the focus was on tacit knowledge transfer. The sessions were held in camera, no notes were taken or recorded and what was discussed in the room stayed in the room (Davenport and Prusak, 2000).

Similarly, Dan Holthouse, Director of Corporate Strategy at Xerox, USA believes that ideally tacit knowledge sharing should involve one to one contact. However, he points out that if the questions raised to seek out tacit knowledge are clear and focused then it may be possible to transfer deep tacit knowledge remotely by telephone, text or online. The recipients may not need to be in the same room. For specific transfer of tacit knowledge, it may be difficult for the recipient to pick up on certain nuances or visual innuendo without face-to-face interaction (Holthouse, 1998).

Organisations may be concerned that at times they are doing too little to encourage the transfer of tacit knowledge from retirees to younger generation Y workers (born between the mid-1980s and the late 1990s). Perhaps one of the problems for organisations is not knowing where to start with a transfer programme. There is also a hesitation in some organisations to offer any form of incentive for this transfer process to occur successfully and amicably. A third barrier to this

knowledge transfer is that there is no general course or training specifically dealing with the transfer of tacit knowledge (Piktialis and Greenes, 2008). The culture and attitude of the organisation must be open to change and transfer of knowledge and information. Self-protection for job security may be a latent factor obstructing the transfer process. Using an example of ‘socialisation acquisition’ of tacit knowledge that referred to the various levels of immersion a trainee experiences while learning his trade in a large industrial plant in Brazil, Ribeiro (2012) describes the different learning opportunities experienced by the novice during a pre-operational training programme. These are set out in Table 2.6. This research study uses a framework to examine the similarities of Ribeiro’s example with the construction industry and how the experience of transferring tacit knowledge can be improved.

SELF-STUDY	LINGUISTIC SOCIALISATION	PHYSICAL CONTIGUITY	PHYSICAL IMMERSION
On-line training	Informal face-to-face meetings	Technical visits	On-the-job training
Technical reading	Technical discussions	Witnessing plant assembly	Trial and error with daily practice
Internet Library and Database search	Classroom training	Physical Engagement (Awareness, Somatic Tacit Knowledge)	
	Socialisation with experts – collective tacit knowledge		

Table 2.6 Pre-Operational Training – Level of Immersion (Ribeiro, 2012)

Ribeiro’s example was recorded following pre-operational training sessions for novices in a large nickel plant in Brazil, in January 2009. The nickel plant was a US\$3.2 billion investment, close to the Amazon jungle in a remote location and employing 1,490 people. The training period averaged 80 days (for operational staff) and 97 days (for maintenance staff) per person. Their trainer was a metallurgical engineer with thirty years’ experience. The variety of tasks undertaken by the novices included carrying out 40 successful metal tappings or casings and solving various maintenance puzzles pre-set by the supervisors. Training was by continuous assessment until completion. The novices were required to have at least 3 to 5 years’ ‘after start-up’ experience to enter the training programme.

The novice’s exposure to the expert’s time and goodwill supported them with ‘word of mouth’ and ‘ways of doing’ which ultimately supports the domain’s (in this case, the plant’s) collective tacit knowledge. On-the-job training was categorised under physical immersion, classroom lectures using linguistic socialisation and ‘real work’ settings.

Ribeiro's research gave examples of both defending levels of immersion or commenting on the ineffectiveness of training elements. While not exhaustive, it does highlight examples of advantages and disadvantages that could be utilised for training in other industries.

2.5.14 Outcomes and observations of Ribeiro's Table

- A. **Self-study element:** Self-study by the novices (young engineers, supervisors or control room operators): while eager to learn, they mostly studied and visited the plant alone. Although they had pre-read all the manuals and studied the drawings and specifications, they were clearly lacking in socialisation with experts and their absence of previous physical engagement with large industrial plant became clear (Ribeiro, *op cit.*).
- B. **Linguistic socialisation:** Novices were asked to read papers and explain specific elements they had seen or heard on the shop floor. This learning process provided the novice with a shortcut to understanding technical process issues *in-situ*. This also involved talking through the procedure or problem by interaction with the expert(s). Because of linguistic socialisation, novices start to learn how to make their own correct judgements (Wittgenstein, 1953). However, Ribeiro points out that linguistic socialisation alone is not the entire component to a novice's training and that this will only complete the process, when physical contiguity and immersion also takes place. "A film (training video) does not present any risks," (Collins, 2004). There are things that the camera will not catch.
- C. **Physical contiguity:** Implies 'detached observation' as opposed to 'involvement' in the process. A novice gets the opportunity to visit the plant but does not experience the 'hands-on' doing of the actual task. Visiting the plant allowed the novices to discuss problems with the staff and experience 'story-telling' as a means of learning from the experienced personnel. This provided an opportunity to experience the heat and risks of the plant and to get the chance to witness unforeseen events. (Collins, *op cit.*).
- D. **Physical immersion:** The situational aspects of the 'real world' provided the novice valuable insight into the actual job performance. One such example was where an operator had to adjust his manual abilities to operate a specific machine effectively. Real learning situations support and enrich interactions between the details and the overall significance of the situation. (Dreyfus, 2009).

In summary, the links between the various levels of immersion, tacit knowledge and expertise can be used to analyse the gains for the experts, novices and the organisation. More importantly, these results can enhance the planning of an improved training programme. (Ribeiro, *op cit.*).

Using the example, structure and findings of Ribeiro's research with the Brazilian nickel plant the following may be considered for developing a training programme. The similarities between a novice engineer with three to five years' experience applying explicit knowledge to 'on the job' applications are similar to any young aspiring professional hoping to gain practical knowledge not otherwise available in texts and publications.

Comparing the Ribeiro experience with construction graduates attending the 'site environment' for the first time, job specific duties and responsibilities may involve the individual performing online searches or attend CPD training courses to gain an aspect of tacit knowledge before visiting the site. Professional institutes and society publications may also be a good starting point to source specific training information.

Examples of site-located knowledge would include:

- Health and Safety Procedures on site Induction, Safe-Pass, PPE, accessing restricted areas and storage and waste regulations for the site.
- Attendance at site design workshops.
- Recording delays and disruptions at site.
- Dealing with subcontractors on site.
- Security issues on site such as hoardings, fencing, security personnel, cameras, and storage of security video footage.
- Attendance at site meetings.
- Format and hierarchy of management attending meetings.
- Traffic management and site deliveries and restrictions.
- Recording weather conditions – various degrees of inclemency in relation to claims for delay and extension of time.
- Supervised site visits with a purpose. Identifying construction elements on site.
- Immersion in site activities such as attending site meetings, behaviour at site meetings, understanding the hierarchy on site and ability to deal with suppliers and subcontractors professionally and confidently.
- Opportunity to experience a project from inception and design stage through to close-out, practical completion and final account agreement.

The above brief list of training, coaching and mentoring elements for a Quantity Surveyor or any construction professional commencing their tacit education is discussed in greater detail later in this thesis.

2.6 Mentoring and coaching

2.6.1 Introduction to mentoring and coaching

The author has experienced that graduate training opportunities for professionals have become more structured and organised in recent times, certainly since 2010. Financial, accountancy, banking and the legal professions are examples of entities which attract talented graduates with induction programmes, advanced education programmes and internships.

The construction and property sectors may also have such opportunities, but this could be in the larger multidisciplinary practices and the contractors who attract the cream of the educational crop each year. Such companies frequently have an established platform for advancement programmes. The graduates may benefit from counselling managers or may be assigned a ‘buddy’ by the HR department who is usually a more experienced colleague, available to assist and support the graduate following the induction programme.

Small or medium sized organisations may not have the luxury of such back-up. Hence the graduate becomes heavily reliant on immediate supervisors and his or her peer group for career guidance. Organisations such as ISME (The Irish Small and Medium Enterprises Association) assist such graduates with mentoring programmes, but topics tend to be general in nature and not job specific. The cost of such training is usually reclaimable through income tax credits for the employer. Hence the SME company may only suffer the loss of time the graduate or other employee spends on the training course but not the course fee.

There are many definitions for mentoring, coaching and tutelage. The next section explains what these terms mean and how an amalgam of each could be used to design a monitored tutelage programme for Quantity Surveyors.

2.6.2 Mentoring

The term ‘mentoring’ comes from Homer’s Odysseus. Telemachus, son of Ithaca’s king who was fighting the Trojans, was left to be guided and educated by Mentor. A mentor shares their knowledge-base with a student. Usually, this process occurs when a senior, more knowledgeable person guides, assists and motivates someone with less experience particularly in a professional

setting (George and Neale, 2006). While mentoring and advising are not the same, they do have some things in common. Advising takes place normally over a shorter timespan than mentoring. Mentoring may have a broad scope and “lead to positive outcomes in career, work, and nonwork domains” (Ragins and Kram, 2007, p.662).

The importance of mentoring as a training mechanism has experienced popularity with established organisations in recent decades. Literature has focused on the relationship between the mentor and the mentee, the desired behaviour of mentors, identifying mentoring functions, the structure and models of how knowledge can be transferred and the benefits of organisational mentoring. This thesis explores the antecedents of mentoring and evidence of barriers to the successful outcome of the mentoring process. Many studies carried out by Dorothy Leonard in 2011 have found that staff employees who have taken part in mentoring programmes generally performed better in their job role and were promoted more rapidly than those who had not taken part in such programmes. In such roles, mentors are acting informally as teachers.

The mentor to mentee arrangement has changed in recent years to include peer to peer mentoring and reverse mentoring or *protégé* to mentor learning. Individuals who develop years of expertise through practice in industry may be in a position to consider the role of a mentor. It may not suit every individual and financial reward is seldom considered as the driving force to become a mentor. Leonard believes that mentors and *protégés* who select each other will be more successful than those who are appointed. She also recommends that managers who aspire to become mentors should mine the organisational archive for previous lessons learned to support their mentoring programme objective. These experiences when used as a mentoring tool should be a true reflection of the activity and not be manipulated for effect. How does the *protégé* view the mentor who he has entrusted to shape and mould his career for the foreseeable future? Leonard uses the example of the person sitting in the surgeon’s waiting room who must consider the most critical question to ask of the surgeon: have they done this operation before? They may study the diplomas hanging on the wall or check the year of qualification, but the most important consideration is what actual experience they have of successfully performing this task in the past. As previously referred to in this research, we are reliant on the individual’s practice and expertise. Examples of such considerations are for a doctor to distinguish between heartburn and a heart attack or prescribing medication without considering serious potential side effects. All such actions rely on the degree of experience the professional has and what exposure to similar events they have experienced in the past.

In the context of medical clinical practice there are many examples of treatment of patients using explicit knowledge without the utilisation and input of tacit knowledge. One such example (Grace and Grant, 2017) is where a fifty-year-old lady appeared in hospital for treatment of a knee injury. She explained to the young doctor that his treatment was causing her pain, but he persisted with slight modification. The lady eventually went quiet, stopped the treatment and left the hospital. It had unfolded that while the treatment was technically correct, the doctor lacked compassion and human understanding. Experienced practitioners acknowledge that patients are also experts and have a clear understanding of their own bodies and pain thresholds. Doctors must recognise “their strengths and weaknesses, the extent of their professional expertise, their previous clinical experience, and the role of their profession in the health care system.” (Grace and Grant, *op cit.*, p.2125). “Clinical practice is dynamic, relational, and emotionally charged. It inhabits many contexts including that of the client, the practitioner and the therapeutic encounter.” (Grace and Grant, *op cit.*, citing McEldowney and Connor, 2011). Grace and Grant continue by suggesting that mentoring a clinician should include relational skills, reflexivity and ethical decision making. These virtues are vital, integral and less often articulated in professional practice competencies (Grace and Grant, *op cit.*).

Mentoring is a process in which a less-experienced person known as the mentee or *protégé* is encouraged by a person with greater experience, the mentor, to flourish in a profession community. (George and Neale, 2006; Wilson, 2001). Mentoring is identified as an important element of healthy growth, especially in the business context (Shenkman, 2010). The benefits of mentoring are pervasive, particularly for the mentee. *Protégés* of mentoring programmes tend to achieve better remuneration packages compared to their peers. Additionally, they tend to be more in tune with the organisation’s structure and politics and mentees report greater job and career satisfaction (Wilson, *op cit.*).

Face to face mentoring successfully takes place when a suitable mentor / mentee relationship is established. Network mentoring can contain many mentors all providing contributions and assistance for different components of personal or career advancement (George and Neale, *op cit.*).

The mentor acts as a guide, an ally, an advocate, a role model, a confidant, a friend and a catalyst to the mentee. The mentor also helps the mentee understand and interpret the organisational culture in which the mentee works, how to manage and maintain their reputation and how to learn from their mistakes. Interactions between mentors and mentees must be in a trusted and safe environment and it is important that the mentee’s organisation supports and fosters a culture with

honest dialogue. A mentoring relationship could last twelve to eighteen months and both parties need to be clear on terms of reference and what they each expect to get from this interaction. There should also be an assessment period at regular intervals to assess the process and how it is working. The qualitative outcomes for the mentee and the quantitative outcomes in terms of succession planning, employee retention and increased skill performance all need to be assessed.

Reh (2017) raised the question ‘why seek out a mentor?’ He concluded that a mentor is a personal advocate for an individual, not so much in the public setting but rather in life. A good mentor will challenge you to open your eyes and mind to different perspectives.

2.6.3 Coaching

According to the Oxford English Dictionary, ‘to coach’ is “to carry or convey a valued person from where they are to where they want to be”. Coaching can be formally or informally delivered – includes how to improve a skill, carry out specific work-related tasks or navigate the subtleties of a company’s culture. Coaching is still not perceived as a profession, yet it does require a discipline continuum of skills and abilities in a variety of ‘relationship helping’ situations. (Bennett, 2006). The positional variety of coaches includes a manager, a friend, a consultant, a parent, a minister or a peer.

Witherspoon defines executive coaching as “an action-learning process to enhance effective action and learning agility” Witherspoon (2000, p.167). While there are a wide range of definitions, a coach should possess the ability to engage in a discovery process, create an environment where the coached individual can develop, utilise the cyclical or iterative coaching process and be prepared to invest in behavioural and sustainable change (Bennett and Bush, 2014).

John Whitmore defined coaching essentially as “unblocking a person’s potential to maximise their own performance. Helping them to learn rather than teaching them” (Whitmore, 2002, p.8). Coaching can be proactively used to motivate staff, delegate, problem solve, and to deal with relationship and team building. According to Bono, Purvanova and Towler (2009), the top ten topics addressed by coaches are:

1. Interpersonal skills.
2. Stress management.
3. Strategic thinking.
4. Time management.
5. Staffing.

6. Management style.
7. Leadership.
8. Communication.
9. Adaptability/Versatility.
10. Motivation.

According to Bennett and Bush (*op cit.*), when an employer employs the services of an often-expensive coach, he aspires to achieve: improved individual performance, improved productivity, address succession planning, improve skills, improve organisation performance, address specific work problems, boost employee morale. The role of a coach as a consultant may be as an evaluator, messenger and advocate. These roles include a degree of confidentiality and trust both to the individual and the organisation. A coach may also act as a facilitator aiding decision making and problem solving (Schwarz and Davidson, 2008). This activity includes identifying the problem, exploring the options, consultation with key personnel, participation with decision making and preparing the organisation for change. While coaching relationships should be bi-directional, the coach still pursues the principles of experiential learning, discussed earlier in this thesis: reflection in the learning process and problem solving. The coach must establish and display credibility: “readiness for coaching specifically refers to the client’s readiness for change” (Ratiu and Baban, 2012, p.143).

Whitmore also suggests that effective questioning by a coach should include interrogative questioning, focus on the detail, be aware of the ‘blind spots’, be attentive, use the correct tone of voice and body language, be empathetic and reflect back to the starting point of each session to evaluate the goals and ascertain agreement on the success or otherwise of the session (Whitmore, *op cit.*). Communication skills during the coaching sessions include listening as well as speaking,

Kratz and Kratz (1995) detail five types of listening.

1. Listening to bond.
2. Listening to appreciate.
3. Listening to learn.
4. Listening to decide.
5. Listening to enable.

Whitmore suggests three mnemonics in setting goals for coaching sessions (See Table 2.7).

SMART	PURE	CLEAR
S – Specific	P – Positively Stated	C – Challenging
M – Measurable	U – Understood	L – Legal
A – Achievable	R – Relevant	E – Environmentally sound
R – Realistic	E – Ethical	A – Appropriate
T – Time phased		R – Recorded

Table 2.7 Goals for coaching sessions using the mnemonics SMART, PURE and CLEAR (Whitmore, 2002)

If the goal is not realistic there is little hope of success. The person being coached must see the goal as realistic, purposeful and meaningful. The resultant change both for the individual and the organisation may be categorised as either planned change, emergent change, or precipitative change (Bennett and Bush, *op cit.*). Kurt Lewin developed Action Research as part of his planning change theory, emphasising that change requires action, and “that successful action is based on correctly analysing a situation, identifying potential and alternative solutions, and choosing a suitable approach” (Bennett, 1983, p.206).

The style and format of coaching sessions may vary widely and are largely dependent on willingness to receive knowledge and on the need for knowledge transfer by the person being coached. If an organisation intends to make a steady transition to become more participative and to exercise collective management, then all parties need to develop an appreciation for and ability to adopt participatory methods. The company selected for participation in MTP workshops for this thesis displayed a very positive interest from the outset. Management were anxious to monitor how the workshops developed and all participants reacted favourably to new information and to the variety of selected mentors. Additionally, the breakout sessions between each of the workshops allowed the participants the opportunity to voice their opinion on how the MTP addressed their needs. Raelin believes that through an Action Learning practice perspective, staff commence with small steps using two-way dialogue and reflection. This allows them to self-correct after making mistakes, giving them an opportunity to take part in self and team management practices (Raelin, 2008).

Robinson maintained that there were three crucial principles for the human mind to flourish:

1. No two people are the same. We are naturally different and diverse. Leaders should ask themselves are they leading with diversity or conformity.
2. Curiosity is the engine of achievement.

3. People are inherently creative.

Robinson explains that great leaders are usually aware of these principles but do not understand how to deliver them. While his focus is on education and teachers, the three crucial principles could be used as a benchmark for leaders of any discipline. In organic systems, if the climate and conditions are right then life will flourish. Human ability may lie dormant if the climate is not correct for flourishing. An experienced coach must have the ability and tenacity to see the possibility of encouraging this growth (Robinson, 2013). “A coach is not a problem solver, a teacher, an advisor, an instructor or even an expert; he or she is a sounding board, facilitator... who raises awareness and responsibility” (Whitmore, *op cit.*, p.40). Table 2.8 summarises the differences between mentoring and coaching.

DIFFERENCES BETWEEN COACHING & MENTORING		
	Mentoring	Coaching
Focus:	Individual development	Performance improvement
Role:	No agenda	Specific agenda
Relationship:	Self-selecting	Comes with the position
Source of influence:	Perceived value	Position
Arena:	Life/Career	Business or Sport
Time Frame:	Long term	Short term
Agenda:	Open	Set
Orientation:	Relationship related	Task related
Approach:	Non-structured	Structured
Personal Objective:	Improved performance	Personal satisfaction

Table 2.8 Differences between Coaching and Mentoring (Boylan, 2017)

As part of the discussion later in this thesis the design of a bespoke monitored tutelage programme will examine elements from each process.

2.6.4 Ethical considerations for mentoring and coaching

In the absence of a universally accepted code of practice for mentors and coaches, Bennett and Bush (*op cit.*) suggest the checklist shown in Box 2.1.

Box 2.1 Checklist of practices for mentors and coaches.

- Respect for others, dignity and integrity.
- Tell the truth.
- Honouring one's promises.
- Equity - treating others fairly.
- Beneficence - make things better.
- Non-maleficence - do not make matters worse.
- Display fidelity and loyalty.
- Be fair and care for all stakeholders.
- Pursuit of excellence.

The tendency in the world of commerce is to increase productivity, reduce costs and make more profit. Often these pursuits are at the expense of ethical considerations (Bennett and Bush, *op cit.*).

2.7 Generational factors

Research suggests that there are potentially four generations working together. These generation categories are *Traditionalists* (1900-1945), *Baby Boomers* (1946-1964), *Generation X* (1965-1980) and *Generation Y* (1981-2018 and beyond). The workforce in many organisations can span several generation categories. This historical co-existence is unprecedented in the workplace and has resulted in a melting pot of beliefs, cultures and work ethic.

The work ethic across the three latter generational categories varies greatly. Ball and Gotsill (2011) state that traditionalists are viewed as the generation that believed 'you have to earn what you get'. The baby boomers are perceived as self-absorbed and hard working. Generation X are entrepreneurial and independent and generation Y, or the millennials are seen as optimistic, capable of original thinking and have never lived without computers. When these generations are working together the age-gap differences may create tension in the workplace. The baby boomer generation displays the highest separation and divorce levels, which may have a lasting effect on the peer-to-peer workforce relationship while Generation X are accused of having a disaffected attitude and disdain for everything that came before them. This generation was reared during the Cold War, the removal of the Berlin Wall and the AIDS epidemic. They were largely seen as 'hell-raisers' and grew into responsibility to fix the mistakes of the previous generations (Ball and Gotsill, *op cit.*).

The baby boomer generation continues to play a major role in the workplace of 2020. When this generation started arriving in the mid-1940s, they represented change simply by the size of this

generation sector. Viewed as seasoned subject matter experts, this generation has a strong hold on experiential learning, carries critical knowledge and has experienced decades of industrial, economic and corporate change. Traditionally, baby boomers prefer to see staff at desks working rigid daily routines while generation X and Y tend to be more flexible, striving for a better work life balance. Baby boomers have been slow to embrace social media and prefer face to face and/or voice to voice meetings in conventional settings. They also believe younger generations do not have the same work ethic and that they struggle to mesh personal and working life communications (Ball and Gotsill, *op cit.*).

Baby boomer women began joining the workforce in greater numbers in the 1970s and 1980s and were generally seen as being more individualist and confident than previous generations. This era represented occupational desegregation with a greater number of women moving into male dominated jobs. This was supported by changes in legislation dealing with sex discrimination and equal opportunities, both in education and the workplace (Wootton, 1997). In 2016, 59.50 percent of women in Ireland aged between 15 and 64 were in full-time employment. This compared to an EU average of 61.40 percent. In 1997, the figure was 45.9 percent in Ireland in comparison to the EU average of 51.1 percent (source: CSO QNHS Eurostat LFS).

Generation X grew up in the shadows of the baby boomers and were often referred to as ‘latch-key kids’ who had to take care of themselves from an early age. They became resourceful and self-sufficient and displayed a disdain for authority and structured working hours. They tend to dislike being micro-managed and embrace a ‘hands-off’ management philosophy. Resourcefulness and diligence have led them to excel in the workplace, while maintaining a work life balance, unlike their predecessors. This generation embraced technology and welcomed a plethora of hi-tech innovations, especially mobile technologies which allowed remoteness and freedom of working life. They have incorporated social media seamlessly into their personal and working lives and adapted to the ever-changing IT environment. One concept that this generation introduced was work life balance, which previous generations had not demanded. They viewed the previous generation with disdain in this regard and witnessed first-hand how family life suffered with work demands putting pressure on home life. They wanted to take control of both their personal home life and their careers. Both generation X and Y grew up watching TV programmes such as “Sesame Street” and wanted learning to be fun and not a chore. Hence both generations tend to be more collaborative in learning and sharing knowledge. Because texting and social media is so immediate, these generations do not have to wait any length of time to raise a query in class, as

they can procure instantaneous information on social media, which was not possible with previous generations. (Ball and Gotsill, *op cit.*).

Generation Y or millennials have been more sheltered by society than their predecessors and have generally experienced a more stable family environment. They are often considered to be conventional and orthodox in their decisions in life and are accused of being united with deep seated idealism and desire to save the world. On issues such as climate change, this generation are less inclined to blame the past, but prefer to be seeking solutions in the future. They are often stereotyped as being impatient, demanding and possessing a sense of entitlement. Well-educated and well-groomed, they have been sheltered from the crushing or heart-breaking effects of true and disappointing failure. This generation uses technology as a way of life as they have grown up in the Information Age. They have been encouraged by both baby boomer and generation X via lifestyle and education. They constantly use IT, from taking a photograph to seeking out facts via their telephone. With baby boomers remaining in the workplace beyond retirement age, mid and top management opportunities are not coming on stream fast enough for generations X and Y. As a result, millennials are forced to take low paid jobs which makes their mission of job satisfaction even more difficult. A mixed workforce of disgruntled millennials and baby boomers who want to retire but cannot together with cynical generation X, frustratedly awaiting promotion presents a difficult organisational challenge to the achievement of harmony and balance in the workplace (Ball and Gotsill, *op cit.*).

A careerbuilder.com survey (careerbuilder.com, 2007) concluded that Generation Y tended to rely heavily on instant messages, blogs, tweets and texts as opposed to face to face communications. Millennials demand an equitable work life balance, flexible hours, remote working options and, most fundamentally, mobile technology to support their professional lifestyles. In general, baby boomers blame Generation Y for the decline in workplace formalities.

The conclusion of Ball and Gotsill's study of the three generations stated that all three generations need to adapt to each other and reconcile their differences. Baby boomers must realise that the workplace has changed for the better. Mentoring and coaching to and from all three generations could accelerate this resolution and younger generations may need to display patience when working with elders. Economics indicates that the baby boomers are likely to be in the workplace for some time still, due to the 2008 economic slowdown and world recession. Many challenges will continue to arise and must be overcome if this multi-generational workforce is to survive in harmony, but this blended workforce can also bring new and unexpected benefits for generations

to come. Recognising, respecting and successfully tapping into the knowledge mine that senior generations have to offer can create an excellent opportunity for knowledge transfer and team building. In return, Generations X and Y can trade the greater efficiencies of mobile technologies and their IT skills to produce a rich blend of balanced corporate culture.

2.8 Tacit knowledge education, training and transfer for Quantity Surveyors

2.8.1 History and education

After World War II, third level education and research became much more widespread than it had been before the war. This was accompanied by a significant “increase in the number of young people from lower and middle-class backgrounds attending university” (Gibbons, Limoges, Nowotny, Schwartzmann and Trow, 2007, p.73). This change also required a reform of secondary school education in preparation for the option of attending university. That reformation included the need to obtain A-Level examinations in the UK, the Baccalaureate in France and the Leaving Certificate examination in Ireland as a prerequisite for college. The growth of public sector and white-collar jobs also attracted a preference for university graduates. The certainty and continuity of employment, coupled with the prospect of a sound and pensionable job, paved the way for mass interest in college (third level) education.

A significant effect of this increase in education and research was the emergence and realisation of the production and distribution of knowledge. Education, qualification and training needs had to respond to market requirements for new specialist skills and the rapid pace of technological change. Inculcation of positive social attitudes towards knowledge growth and change was well received, with some exceptions. One notable exception were manual workers in heavy industry, such as miners. According to Gibbons *et al. (op cit.)*, mining communities were unprepared for such technological advances and became real victims of radical social change. These communities did not easily fit into the new learning and information society.

In these formative years of education, explicit knowledge acquired in school could be described as replication, application, interpretation and association (Broudy, 1964). In education and training quite often know-how can be omitted, also common knowledge can be structured, labelled and perceived differently (Eraut, 1985). Tacit knowledge may not be realised through normal education but may flourish for effective transfer later (Leonard and Swap, 2005). Leonard further suggests that graduates seldom make a decision on ‘gut feelings’ which is pure tacit knowledge decision making. Confidence to make mature decisions requires an experienced and qualified senior manager. It may take some time for a trainee graduate to have both the confidence and ability to

tackle impactful situations. Systematically working through a problem or critical issue with an experienced professional can divulge to the graduate the resources they need, where the best information may be sought, what alternatives were considered and what criteria should be used to select a final response to the posed problem (Leonard *et al.*, 2015).

In this Age of Information, knowledge is often described as a resource like oil or gas and in many ways takes precedence over money. Therefore, intellectual capital should be a priority for any successful organisation (Stewart, 1997).

2.8.2 The training of a Quantity Surveyor

The construction industry in Ireland plays a significant and sizeable role in the country's gross domestic product (GDP). Ireland's construction output is said to reach €20.2 billion by 2020. The construction industry is complex for a number of reasons and differs greatly from manufacturing on many levels, a major difference being the lack of uniformity of final output (Murphy, 2011). The role of the QS in the construction industry relates primarily to construction cost control and ensuring that the client is protected in terms of timescale, quality and the delivery of projects within an agreed budget.

The section below outlines the training undertaken by a graduate Quantity Surveyor, the roles and responsibilities of a Quantity Surveyor, the process of achieving 'chartered' status within the various institutions and research into the training gap for the graduate QS. Should an SCSi member choose to work abroad as a Quantity Surveyor they must resign their SCSi membership and use the RICS designation. Quantity Surveyors may be employed by local authorities, in the wider public sector, the financial services sector, professional practice quantity surveying organisations and quantity surveying departments or divisions within general contractors and civil engineering contractors. The following is the conventional and traditional route to becoming a chartered surveyor in Ireland.

2.8.3 Assessment of Professional Competence

The Assessment of Professional Competence is an evaluation of on-the-job, experiential learning carried out by the Quantity Surveyors' professional institution (the SCSi in Ireland). Successful completion of this monitored on the job training in tandem with combined with academic achievements can lead to RICS/SCSi membership. The APC's goal is to confirm that the candidate is capable of practicing as a chartered surveyor. The APC usually consists of 24 months monitored training and a final interview after a minimum of 400 days practical experience.

For individual candidates, the duration of this process may be extended subject to supervisory appraisal of participants' development. RICS and SCSi identify that certain candidates may already have attained enough 'on-the-job' training prior to achieving a recognised degree. This is reflected in the APC requirements. Candidates with more than 5 years' relevant experience may apply for a reduced structured training period.

2.8.4 APC key elements

The key elements of the APC as identified by the SCSi are set out in Box 2.2. SCSi will insist that the candidate's progress is regularly monitored by an approved supervisor and counsellor. Ideally, SCSi prefer the supervisor and counsellor's experience to be from an equivalent area of surveying as the candidate.

Box 2.2 Key elements of the APC (Assessment of Professional Competence) identified by SCSi.

- Candidates must meet enrolment criteria laid down by the SCSi.
- SCSi appoint a supervisor and counsellor.
- Candidates must carefully select and plan a list of competencies.
- Candidates must provide training and pre-qualification structured learning (PQSL).
- Candidates must record daily work experience in an APC diary and summarise this in their logbook monthly.
- Attend regular attend regular supervision meetings.
- Progress of their training must be reported regularly by their supervisor and counsellor.
- Provide sign-off final assessment submissions – competencies, logbook, records of their Pre-Qualification Structured Learning, and critical analysis of same.
- Apply for final assessment.
- Attend final assessment interview.
- Results and final APC report.

2.8.5 Competencies and final assessment

The SCSi require three competency levels, mandatory, core and optional. Mandatory competencies comprise the candidate's personal, interpersonal and working skills that are common to all application routes. Core competencies are the set of skills the candidate chooses for APC route. Optional competencies are nominated by the candidate from the selected APC list. The candidate is also required to undergo a period of structured training to comply with APC requirements. Candidates must also be prepared to answer competency-based questions at APC interview. Candidates must demonstrate their ability to perform under typical surveying work environment.

Supervisor and counsellor must confirm that the candidate has reached these required levels before progressing to final assessment stage. A pre-requisite to final stage assessment is certification from the supervisor that the candidate has reached appropriate proficiency to attend the APC interview.

The top ten reasons for referral at the APC final interview are set out in Box 2.3 below.

Box 2.3 The top ten reasons for referral at SCSI/RICS APC interview.

- 1) The candidate has not referred to the APC resource material *i.e.*, guides, websites and correspondence from the education department.
- 2) Documentation presentation of poor quality.
- 3) Weak critical analysis: a mandatory aspect of the candidate's submission which takes up one third of the interview. It is the main area of the interview where the candidate has complete control and is expected to provide a critical appraisal of their role in a project.
- 4) Candidate failing to prepare their presentation and for their interview.
- 5) Inadequate PQSL (Pre-Qualification Structured Learning) learning – candidate requires 48 hours of PQSL over a 12-month period as a minimum requirement. Candidates are examined on the quality of training recorded in their logbook.
- 6) Core competencies: Candidates are tested by the professional group on their core competencies to become a chartered surveyor in their area of specialisation.
- 7) Optional competencies: It is important that a candidate pursues a correct optional competency choice, as they may be questioned in depth on these choices at interview stage.
- 8) Lack of experience. The candidate must satisfy their counsellor, prior to final assessment that they have achieved the required competencies.
- 9) Ethics. In the final ten minutes of the APC interview, the candidate is examined on the Institute's code of conduct. Failure to display an understanding of the code of ethics will result in referral.
- 10) Referred candidates advised to study and act upon the information in their referral reports.

For Quantity Surveyors, a knowledge steward or private tutor is not a new phenomenon. In 1891 Richard Parry began coaching young surveyors for the Institution examinations and, so great was the demand that, by 1899, joined by his two sons and brother A.E. Parry, he developed a correspondence course dedicated to surveyors and the Institute's examinations (Thompson, 1968). The APC objective is to ensure that candidates can put their knowledge and understanding into practice to meet the expectations of the Society. Both SCSI and RICS have APC 'doctors' to assist the candidate through this training period. Once chartered status is achieved Quantity Surveyors

must maintain, improve and broaden their knowledge and skills through Continuing Professional Development (CPD) acquired through regular courses and seminars set out by the Society. Having attained the status of chartered Quantity Surveyor, one is expected to comply with the rules of conduct and ethical behaviour as set out by the Society.

2.8.6 Preparation for Practice: Quantity Surveyor, Architect and Engineer Comparables

Figure 2.9 below shows the pathway for a novice Quantity Surveyor through to full professional status, using route two as an example of APC pathway.

All three professional bodies have a similar pathway and timeline to achieve suitability for practice (See Figure 2.10). Subtle differences exist which should be considered further.

SCSI / RICS Assessment of Professional Competence : Chosen Pathway Route to Graduate 2

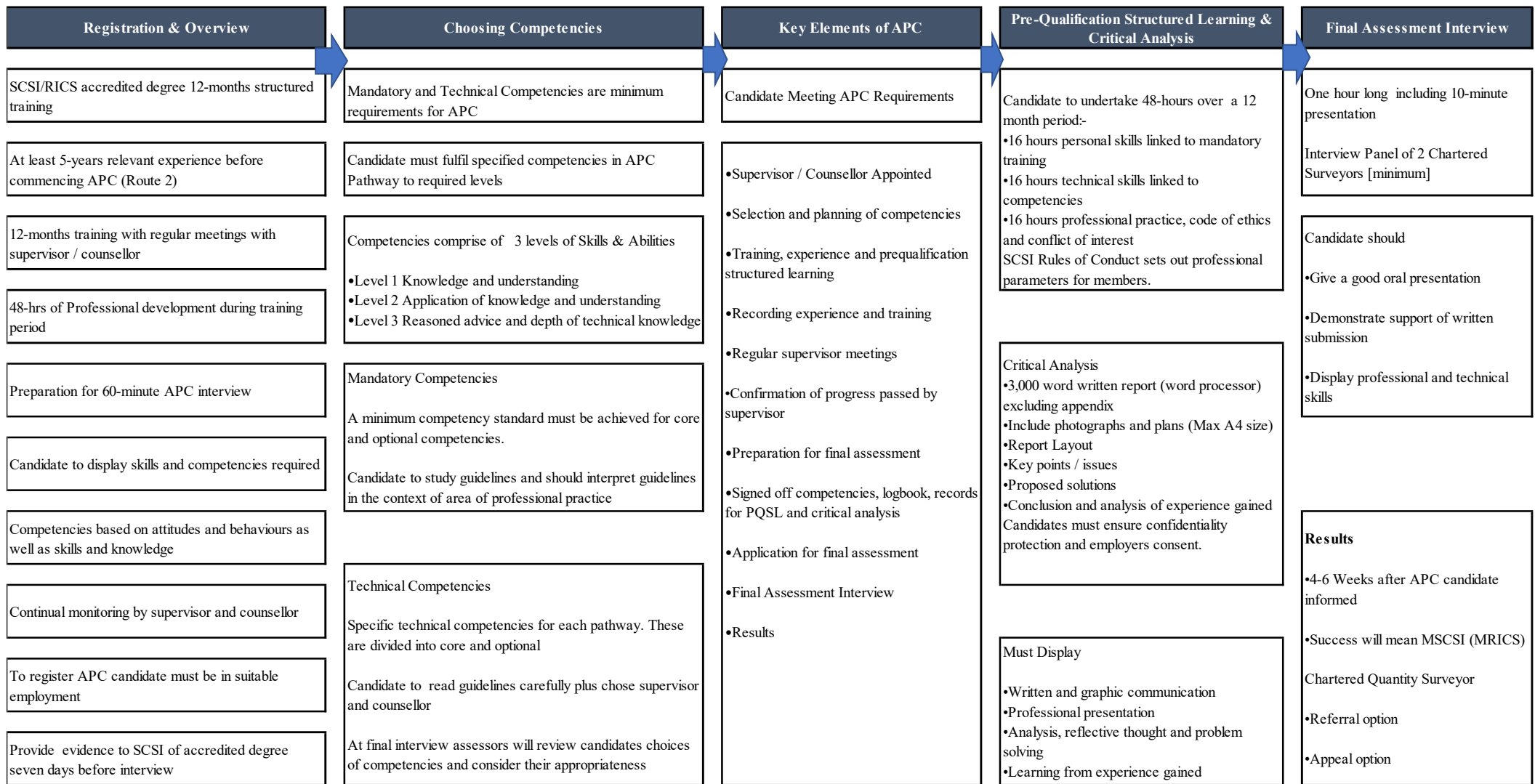
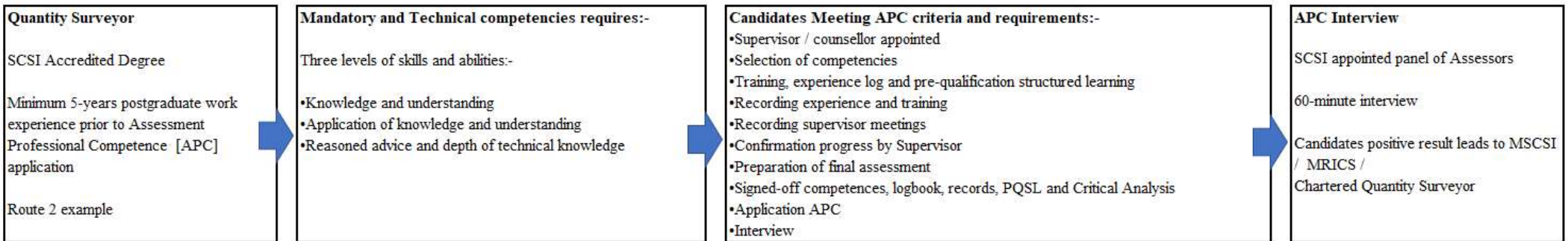


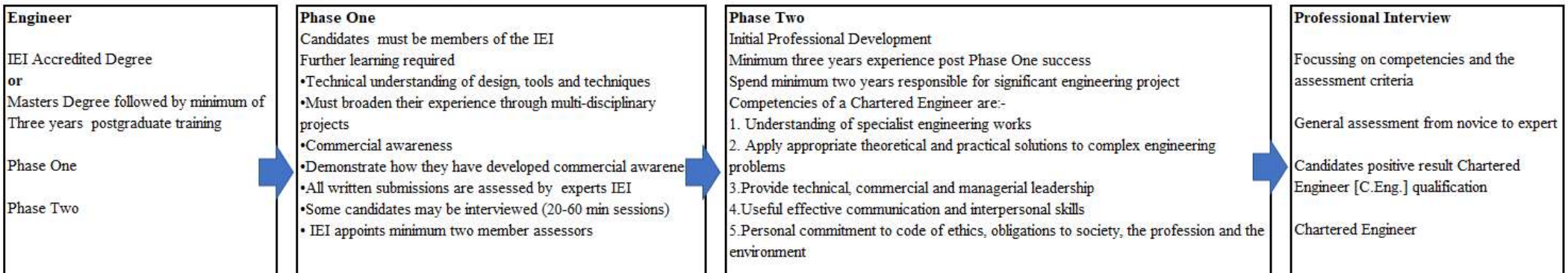
Figure 2.9 SCSI/RICS Assessment of Professional Competence

Construction Professionals in Ireland - Comparative Analysis of Preparation for Practice

Quantity Surveyor : Society of Chartered Surveyors Ireland [SCSI]



Engineer : Engineers Ireland Institute of Engineers of Ireland [IEI]



Architect : Royal Institution of Architects Ireland [RIAI]



Figure 2.10 Comparative analysis of preparation for practice (Construction Ireland)

In the author's opinion the SCSI could consider adopting a selection of preparation for practice procedures from the other professional bodies.

- (1) The two-phase approach adopted by both the IEI and the RIAI could be considered.

Phase One: A more structured and formal approach dealing with the technical ability and explicit knowledge acquisition, possibly with an examination and interview on completion.

Phase two: Focussed on ethics, management practice and project controls leading to a final interview and APC completion.

SCSI could consider a relevant Master's degree as an exemption to Phase One of the overall process.

- (2) The IEI reserve the right to interview the candidate at the Phase One stage of the preparation for practice process. This may be advantageous for the APC candidate as a precursor to the final interview plus it may allow the SCSI to ensure the candidate is on the correct track and that both supervisor and counsellor are performing their function.
- (3) The RIAI require their candidates to take a year out of college and work in a practice for that period. SCSI could consider similar and may allow exemptions from elements of Phase Two requirements.
- (4) Other professions researched in this literature review were medical, legal and military. Perhaps the SCSI could adopt elements of their preparation for practice.
 - (a) Medical: The Royal College of Surgeons of Ireland use simulation exercises as mandatory elements for their medical training. The SCSI could consider setting the candidate a challenge of resolving prescribed practice problems as an element of APC preparation under supervisory conditions.
 - (b) Legal: Barristers achieve qualification and experience by working as a 'devil' or as an unpaid assistant to the barrister in court actions and research. Perhaps the SCSI could consider a similar approach where candidates could be assigned to an experienced Quantity Surveyor for a set period to shadow the professional in a structured fashion to gain practical experience.
 - (c) Military: The initial intensive training that military cadets undergo could be replicated by the SCSI where candidates undergo 'work camps' or weekend workshops to experience teamwork at resolving contract problems and conundrums pre-set by the SCSI.

2.9 Potential stakeholders for a knowledge retention programme

The stakeholders of the programme may include any of the following:

- The *organisation*, which may consist of a professional quantity surveying practice. The practice may be small (employing 1 to 10 personnel), medium (employing 10 to 30 personnel) or a large practice (employing 30 upwards of personnel). This may be a consultancy company or a department of Quantity Surveyors working for a local authority or State organisation. Alternatively, the organisation may be a quantity surveying department within a construction or civil engineering firm. This department may include such specialists as estimators or mechanical and electrical experts working on design and build projects.
- The *individual employee* Quantity Surveyor. This person need not necessarily be a newly qualified graduate with obvious training needs. Quantity Surveyors at all levels can become programme participants if successful succession planning is to be implemented. Mature and more experienced Quantity Surveyors could experience reverse peer mentoring by trading knowledge with each other. Such examples may include peer to peer mentoring where an older Quantity Surveyor may wish to upskill their IT or technical ability in return for tacit knowledge transfer dealing with fundamental Quantity Surveyor duties.
- The *supervisor's* input into the participants' training requirements must be taken into consideration when organisation skill gaps are identified by either the supervisor or organisational management.
- The *HR department* dealing with the organisation's human capital. Its expertise and knowledge will support the design of a bespoke knowledge retention programme to encourage the transfer of tacit knowledge for programme participants.

Other potential stakeholders perhaps worth considering for inclusion in the programme are the professional societies and professional institutions such as the SCSI, RICS, and CIOB. Subject to tax concessions, relevant tax authorities may consider the programme applicable for a tax rebate for the cost of training by the organisation or tax credit for the participants. It may be in the interest of the State if supported training and upskilling programmes deter experienced professionals from leaving the country and tax jurisdiction once qualified.

2.10 Programme ownership within an organisation

Workforce planning (WFP), analysis and the workforce planning model was used in the mid-1990s on a strategic basis for making short and long-term plans. It was done to ensure that plans remained valid in the sense of meeting their objectives. WFP was initially used extensively by the public

sector and then in the early 2000s was used by the private sector. These WFP tools analysed the competencies of the workforce and measured them against anticipated organisational need. This was to allow the organisation to assess the operational gaps. WFP generated resource requirements against the strategic plan which captured the new projects and the services the organisation could offer in the short to long term.



Figure 2.11 Strategic Planning (Boylan 2017)

In an organisation, the operations department would own the strategic plan and the budget department would monitor the costs associated with the other two areas (See Figure 2.11) All areas merge on the goals the organisation can or will achieve. The knowledge transfer programme may reside and be owned between HR and Operations. The ultimate output of an MTP is organisational knowledge management.

The goal for both the individual and the organisation should remain the same: a bespoke knowledge transfer programme. Its purpose being to capture potential lost critical knowledge and tacit knowledge from experienced personnel and to transfer it to individuals. This will enhance tacit knowledge and improve the organisational knowledge base.

In this case the role and responsibility of the HR person or department in an organisation is to encourage knowledge transfer. This means they must take on the role of a teacher in school for a pupil (Whitmore, *op cit.*, p.19): “Teachers must elicit and work with the pre-existing understandings that their students bring with them”. Teachers, like mentors or coaches, must know their students. They need to know their strengths and weaknesses plus cultural and social background. The student is not an empty vessel to fill but comes pre-programmed with learnings and understandings that may or may not be correct.

Certain topics require teachers to possess in-depth knowledge. Superficial coverage of all topics must be replaced by in-depth coverage of selected topics to allow key concepts in that discipline to be understood. Teachers must come with experience and a deep knowledge of the subject area themselves. Assessment must test deep understanding rather than surface knowledge. This assessment must guide modification and thinking and should tap into the overall understanding rather than simply repeating facts or performing skills in isolation (Whitmore, *op cit.*).

2.11 Organisational and individual vulnerabilities and training deficits

Historically the construction and property industry in Ireland and the UK has been subject to cycles of boom and bust. Organisations often lack the resources to meet market demands and there is a real possibility that a downturn in the market may result in the organisation losing staff. Staff may be lost to competitors or they may emigrate. The experienced staff who emigrate may not return when the downturn ends. So, if organisations wish to retain the staff who possess hard earned knowledge, they must prepare for the downturn by either downsizing and losing staff or diversifying into new markets. Organisational HR need to identify the effects that a market downturn would have on the organisation's staff. Traditionally, quantity surveying practices endeavour to retain their staff in a downturn by reducing costs and procuring work at a lower and more competitive rate. The risk associated with these actions is that this may not be sustainable and may lead to a price war and a 'race to the bottom' including below cost fee proposals for new projects.

Once the stakeholders in the programme have been identified, the vulnerabilities and gaps can be analysed further.

The starting point for the organisation in the further analysis may be to focus on a knowledge retention programme that is in line with its strategy. This may highlight the critical knowledge vulnerabilities that have been exposed and, in the light of this, how the organisation may be helped retain this knowledge heading into a downturn. For an organisation to buy into a bespoke knowledge programme such as the MTP, it will need to know if the cost and time associated with such a programme will make a tangible difference on delivery. Perhaps the logical place to start would be to evaluate the cost benefits and potential savings to an organisation if it agreed to participate in the programme. Another potential benefit could be increased productivity and output. Further possible benefits that could be explored may include the boosting of working morale, social interaction, networking and a potentially improved working environment.

In drafting an MTP for knowledge retention, there is a need to get to know the organisation and its position in the marketplace. This may be by an initial brainstorming session with HR and management personnel. After investigating succession planning, key person critical knowledge exposure, and changes in the market environment, the programme could be designed to address these vulnerabilities. There is the possibility that not everybody buys into Polanyi's definition of tacit knowledge. It is not uncommon for knowledge workers to argue over just how deep and unreachable tacit knowledge actually is (Ball and Gotsill, 2011). Before an organisation can see any benefits from the implementation of a knowledge retention programme, the programme drafter must clearly identify potential vulnerability and knowledge gaps and perhaps allow the organisation the opportunity to consider costs and benefits that might arise from such a programme.

From an individual's perspective, participation in a knowledge retention programme such as an MTP may be an easier decision than the concerns of the employers. The participants would get the opportunity to voice their concerns regarding knowledge gaps and vulnerabilities and, if the cost of the programme is met by the employer, then participation may be a foregone conclusion. If their company management, HR and supervisor have bought into the programme, the employees concern may be about their own performance during the programme and whether there is any proof of a tangible, measurable, increase in their capabilities and work performance. Ideally, if an individual's training and career goals are in alignment with the organisational strategy then the task of the organisation is to present the best possible programme. Such a programme would lead to benefits, including cost savings, for all the stakeholders involved.

The next stage is to set about designing the knowledge retention programme. The first task in this process is to define the possible problem(s) to be addressed by the programme.

2.12 Defining the problem

Having established the gaps in training and organisational vulnerabilities, the programme can then develop an approach to and resolution from the training and development process. The various stakeholders must buy into the MTP and all participants must be assured of the potential benefits to both the individual and the organisation. Culturally the individual's attitudes to knowledge sharing may need to change. An employee may feel that critical knowledge gives them a degree of security. Consequently, sharing this knowledge might weaken their position in the future. Defining the problem at an early stage of implementing the programme sets the context for the knowledge transfer items that are planned for inclusion in the programme.

Sabre Airline Solutions provides an example of how a corporate entity defined a problem and set about solving it through interaction between employees by way of social media. This company, based in Texas, helps airlines to market themselves, sell products and operate more viably and successfully. Sabre operate in 60 countries employing more than 10,000 staff many of whom work remotely online in a support capacity for the company. The problem that Sabre faced was that because of working on four continents, staff did not have a peer to ask about a problem or what a specific customer expected from this support company. With such a large global workforce, Sabre trialled a social media platform to promote communications and collaboration between their staff. When a query was raised, the platform sent the employee request to 20 paired or matched profile employees and most queries were answered within one hour. All questions and answers were stored on a database for future reference. The difference between the Sabre style platform and a knowledge base is that individuals have immediate access to the platform for help in solving work problems. The 20 employees will have had their profiles matched in advance by Sabre through experience, location and region of business activity. Although this method is based on a social media platform, it is perceived by the stakeholders as a people solution and not a technology solution. It establishes connectivity between personnel who are working remote from the main location of the employer and also remotely from each other.

As colleagues met online, they became a resource for each other solving a work problem. This process developed employees to be self-motivated (Ball and Gotsill, 2011). Employees thus became enabled peer to peer mentors.

2.13 Framework and Programme Design

Examples such as the Sabre peer to peer mentoring solution above rely on the organisation's willingness to identify the knowledge deficit and be proactive about addressing the gap. Mentoring or coaching assistance trusts the mentor or coach, with imparting the most valuable and useful information and knowledge to the organisation's employees in an ethical and professional manner. Once the problem is defined and a recommended mentor suggested to lead this element of the programme, all stakeholders must feel comfortable with the choice of the employed expert as a knowledge enabler (von Krogh *et al.*, 1998). Knowledge enablers have three significant roles. First, they should stimulate individual knowledge development. Second, they should tackle obstacles within the organisation to protect this knowledge and, third, they should facilitate the sharing of individual knowledge to other members in order to transform the organisational knowledge base (von Krogh *et al.*, 1998).

This knowledge transfer or monitored tutelage programme may be set up similar to Action Research workshops. It may use the framework of Action Research. This comprises *planning* what knowledge is to be transferred, *acting* out the task or problem to achieve an *agreed resolution*, where the facilitator observes how the group or set have reacted to solve this problem and later as a group *reflecting* on how the resolution worked. This process is then repeated in cyclical fashion never reaching a terminus but always progressing.

Similar to Action Research workshops, participants in the MTP knowledge transfer programme may meet once or as often as required. This depends “on the complexity of the problem and the time available for its resolution. The Action Learning session may take place for one entire day, for a few hours over a few days, or over several months. A group may handle one or many problems. Whatever the timeframe, Action Learning generally operates along these stages and procedures.

Formation of group: The group can be volunteers or appointed, and can work on a single organisational problem or each other's department's problems. The group will have a predetermined amount of time and sessions, or it may determine the time parameters at the first meeting.

Presentation of problem or task to group: The problem is briefly presented to the group by the problem presenter, who can remain as a member of the group or withdraw and await the group's recommendations.

Reframing the problem: After a series of questions, the group, often with the guidance of the Action Learning coach, will reach a consensus on the most critical and important problem the group should work on, and the group should establish the crux of the problem, which may differ from the original presenting problem.” (Marquardt, *op cit.*, p.238).

Table 2.9 illustrates the five key knowledge transfer stages as outlined by Calixto (*op cit.*).

Five Stage Knowledge Transfer Programme - Designing a Knowledge Transfer Programme
(Calixto, A. 2012)

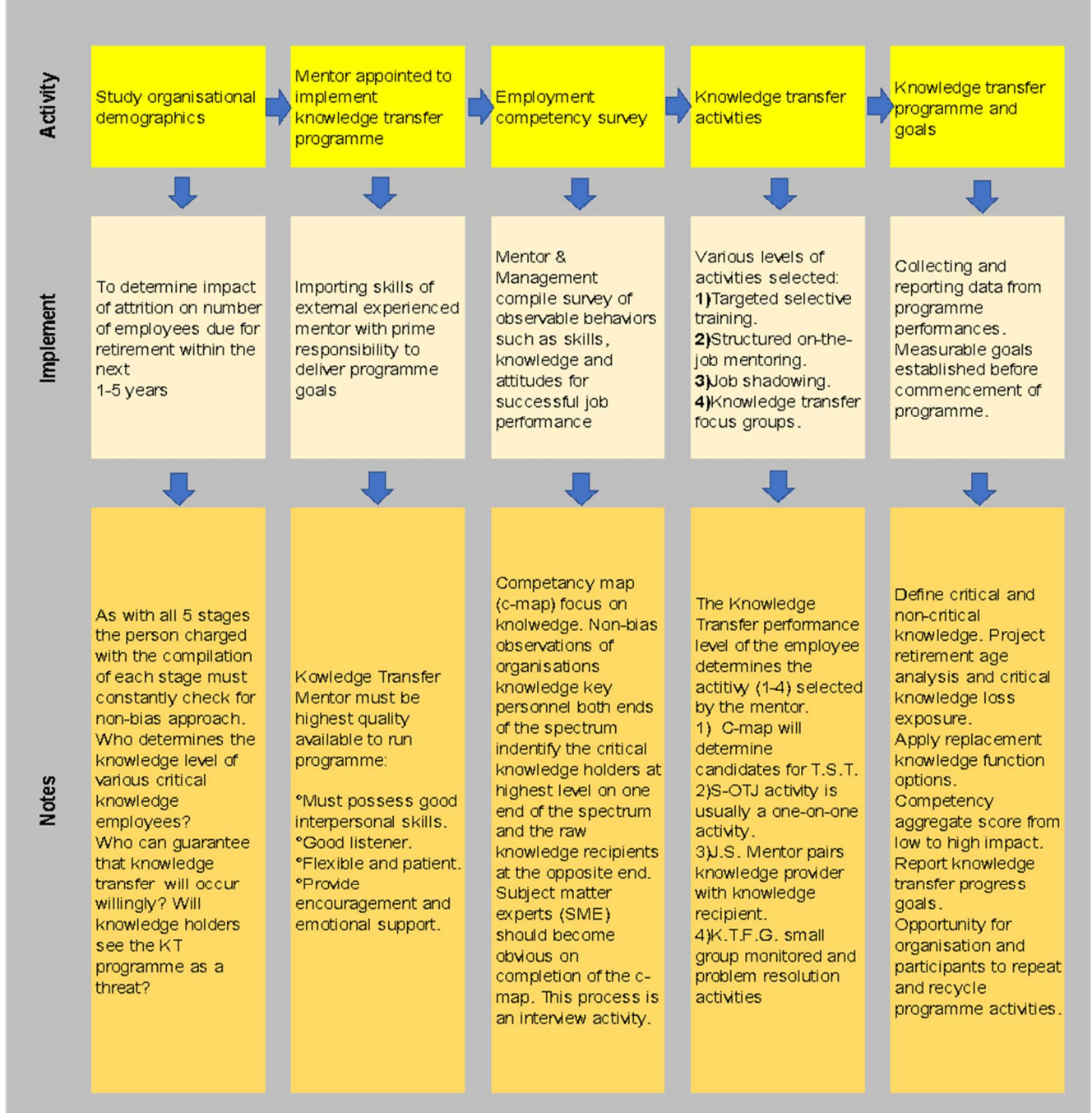


Table 2.9 Five Stage Knowledge Transfer System (Calixto, 2012)

The knowledge transfer programme may incorporate the following five key provisions:

- A study of company demographics data to determine the extent of the impact of attrition on various company disciplines.
- A mentor responsible for the implementation of a knowledge transfer programme.
- Employee competency surveys to determine where knowledge is and where it needs to be within a selected discipline.

- Knowledge-transfer activities to move the knowledge from knowledge holders to those who require the knowledge in the affected disciplines.
- Knowledge transfer programme goals to monitor and report the progress of the programme.

Calixto expands on the five activities as follows:

- (1) *Company demographics*: Before implementation of a knowledge transfer programme, the mentor must first determine the disciplines within the company that are impacted by high attrition and, also, the extent to which it is affecting or will affect the disciplines. For example, in a company of 1,000 personnel, 30 percent may be approaching retirement age over the next five years. This means there will need to be an HR assessment for skills transfer and for providing provision for the transfer of adequate knowledge and skills. The disciplines affected within five years could then be determined from this attrition rate
- (2) *Selected mentor*: Mentors appointed to lead such programmes must be skilled and experienced people. The mentors' primary responsibilities are to ensure the implementation of an effective programme and to guarantee that the programme goals are achieved. They must first carry out competency surveys to determine where the knowledge is needed. This knowledge transfer is not only among senior managers but is also for younger, less experienced personnel. Normally technically competent, mentors must also possess the following characteristics:
 - Good interpersonal and communication skills.
 - Enjoy working with others.
 - Good and sympathetic listener.
 - Sensitive to the need of others.
 - Willing to share skills and knowledge.
 - Flexible and tolerant of differences.
 - Patient with people and understanding.
 - Confident to lead and help others.
 - Provide encouragement and support to others when required.
- (3) *Competency survey*: Competencies are observable behaviours that include the attitude needed to carry out the job both efficiently and effectively. The mentor, having met each individual employee in their discipline, together with the employee completes a competency survey checklist. The mentor then asks the employee to discuss cognitive competencies needed to perform the skills outlined in the competency checklist in a 'show

and tell' structured interview procedure. The mentor can then score the survey by allowing the employee to demonstrate a particular competency. The employee can be scored on their demonstrated competency or else score zero for competencies where ability was not demonstrated. The total number of points earned determines the competence level of the employee. The competency survey compares the competency level of each employee as compared to the competency requirements for their respective discipline. The mentor is then able to determine which employees in a discipline possess the knowledge and which employees will benefit from participation in the transfer programme. This process will also highlight the knowledge and skills gap between senior and less experienced staff.

(4) *Knowledge-transfer activities*: The programme provides four specific types of activities for transferring the knowledge and skills from senior to junior employees. The type of knowledge and the activity used to transfer the knowledge depends on the employee's competence level. The four levels of knowledge transfer are:

- Level 1: Targeted selective training
- Level 2: Structured on the job training
- Level 3: Job shadowing
- Level 4: Knowledge transfer focus group

Knowing the employee's competence level, the mentor can then proceed to designate specific activities to cause the transfer of knowledge from experienced to less experienced employees. The mentor will use targeted selective training for tasks where employees score at competence level 1. Structured on the job mentoring is used for tasks where employees score at competence level 2, job shadowing for tasks where employee's competence level 3, and transfer focus group for tasks where employees scored at competence level 4.

(5) *Knowledge transfer programme goals*: In order to manage a sustainable knowledge transfer programme, the mentor must collect and report data with results back to management. Prior to this it is important to set out and agree goals that define what is to be achieved and scored in the programme.

Calixto suggests that a recommended goal scoring would be as follows:

- 45% level three
- 35% level four
- 10% level one
- 10% level two

This, Calixto says, is achievable in four years of a sustainable knowledge transfer programme (Calixto, *op cit.*).

Knowledge transfer frameworks such as the Calixto method, the Sabre peer to peer example given earlier and the Piras Group model explained later are all methodologies studied for the establishment of an MTP. The HR Manager in the host QS practice for the workshops was keen to assist in the selection of candidates for inclusion in the programme. The HR Manager was also keen to assist in assessing the applicability and relevance of topics suggested for the workshops. The researcher suggested waiting until the candidates themselves had spoken and voiced their opinion of the relevance of knowledge gaps to be addressed. In the end the selection of the framework for structuring the four workshops could not have happened without the involvement and participation of the candidates. The success of the workshops could only have happened when the candidates became involved and, to a degree, took control of the workshop content. The HR Manager later agreed and accepted this scenario after witnessing the energy and enthusiasm of the candidates once they had input and control.

2.14 Industry norms and accepted practice

There are several examples similar to the Calixto model that address a knowledge transfer programme. The Chevron Bridges project is one such example. Former Chevron employees were encouraged to take part in an experience and knowledge sharing and relationship programme with the company. Retirees voluntarily signed up to a Chevron Alumni Community on the company website. This portal allowed interaction on live projects for retirees to comment and make an experienced contribution to their former colleagues. This option then progressed to a situation in which the retiree offered to mentor junior or middle-management staff. The retirees could use their past skills and experiences.

Abbott Laboratories also developed an innovative scheme for knowledge sharing. When an Abbott employee reaches the age of fifty-five, they are given the opportunity to scale back their working day in return for mentoring less experienced staff. In 2008, five hundred employees took up this offer which proved a success. The benefits for the knowledge sharer were less stressful work and responsibility in exchange for mentoring. The mentor did not lose benefits such as healthcare, insurances and pension restrictions.

The Piras Group Programme is also similar to the Calixto model. (See Figure 2.12). The steps in the strategy are shown in Box 2.4.

Box 2.4 Steps in the knowledge transfer strategy adopted by the Piras Group

1. Examine the organisation's projected 5 to 10-year plan (what the company hope to achieve, e.g., expected employment, manpower, skills requirement, production output)
2. HR and senior management identify age groups, where knowledge resides and more importantly who owns the knowledge.
3. Assess organisational risk and make an educated prediction of what this loss of knowledge would cost the organisation.
4. Identify critical knowledge gaps both current, pending and mid to long-term gaps.
5. Address gaps by creating a knowledge transfer retention programme.
6. Address and develop phased retirement opportunities.
7. Design educational opportunities and devise methods to lift the knowledge and experience of in the workforce who have less experience.

This Piras Group Programme can be applied to most medium to large organisations.



Figure 2.12 Impact of retirement on institutional knowledge retention (Piras Group, 2015)

2.15 Considerations prior to rolling out a knowledge retention programme

There are many ways to design a knowledge retention programme. The Action Research approach referred to above used Action Research as an instrument to achieve and monitor goals and results. This approach also incorporates the model set out by Calixto. Ball and Gotsill (2011) suggest starting with what is already known. This is done by understanding the status of the organisation's organisational succession planning, knowledge transfer approach and workforce planning strategies. This information needs to be prepared and presented to senior management for review and digestion (Ball and Gotsill, *op cit.*).

Organisation demographics should be broken out as in Fig. 2.13.



Figure 2.13 Succession Planning (Ball and Gotsill, 2011)

The parts of the organisational demographics that should be separated are shown in Box 2.5.

Box 2.5 Parts of the organisation that need to be separated out for analysis in an organisation's strategies for succession planning, approach to knowledge transfer and workforce planning

- Business Area/Unit
- Function
- Structure
- Roles & Responsibilities
- Incumbent staff in roles (named)
 - Staff Start Dates/End-dates/retirement dates
 - Identify Baby Boomers/Gen X/Gen Y classification

Jobs critical to the organisation operations should be identified and staff in those priority roles identified and categorised. Details on whether such staff are approaching retirement should be ascertained. Analysis about the organisational impact of people retiring or leaving should be collected, verified and codified (Ball and Gotsill, 2011).

According to Ball and Gotsill (*op cit.*) the questions an organisation needs to ask itself include:

- How can an organisation assess the amount of knowledge that would be lost?
- How can organisations capture knowledge before it leaves?
- How does employee turnover affect each job function?

Ball and Gotsill state that knowledge transfer on its own will not address the loss of experienced workers. Certain organisations are beginning to change and improve processes with technology, so that incoming employees can address and carry out the corporate mission.

This information is presented to business owners or the board of directors. Content should easily inform them of areas of knowledge where the organisation is vulnerable to the loss of staff. It allows business owners or directors to better assess ways in which they can best address their vulnerabilities. The more one drills down through the current available information and context the better decisions can be made. To make this palatable, focus should be placed on the strategic trouble spots and these should be selectively addressed.

Some examples of possible findings from this type of ‘demographic analysis’ are shown below.

- Generation X, (born early 1960s to late 1970s), after the ‘baby boomers’ the, due to age and natural attrition may be leaving the workforce. The implications of this exodus may tell a compelling story to the organisation. This may be a good starting point.
- The analysis may indicate that the organisation needs a long-term sustainable approach to knowledge retention. It may need to develop a knowledge culture and a training regime.

A further consideration before rolling out a knowledge retention scheme is to anticipate where questions that will emerge and what they might be.

Business is cyclical

For example, since the economic crash of 2007 the organisation may have downsized. By 2018 the organisation may be very busy again. In the interim, twelve years have passed, and ‘baby boomers’, *i.e.*, those born between 1946 and 1964, are approaching retirement and their

organisation must make provision for their replacement. The question then arises about how to do this. Some questions arise frequently, and these are discussed under the sub-headings below.

Resistance

Questions may well emerge from elements of management that are convinced that the programme will not work. They may think that the organisation survived even though there was no such programme in the past. They may think the programme is therefore not necessary. They may not be comfortable with their knowledge being dissected, analysed and discussed openly. Before rolling out a knowledge transfer plan, managers in the organisation must formulate and rehearse a plan to overcome this obstacle.

Workforce development plan

Questions will arise about any workforce development plan. The questions might be: is the lack of knowledge in new or inexperienced staff a safety issue, a reliability issue, a customer care issue and a 'green' issue all rolled into one? Can the organisation withstand a shortfall in any of these areas?

Other sectors in the construction industry that may be affected

Other parts of the construction sector may be affected by staff shortages. Questions will be asked mitigation plans are being put in place? Factors that may lead to loss of critical knowledge in a sector, including the construction sector include:

- Decrease in numbers of graduates taking up courses.
- Apprenticeships discontinued over course of the recession.
- Change in perception of the sector as a good place to work.
- Baby boomer generation exodus and leaving legacy systems that only they have tacit knowledge to operate.
- Generations X and Y do not express interest to work in certain sectors. (Generation X: born early 1960s - late 1970s; Generation Y: born late 1970s/early 1980s to mid-1990s).
- Other questions that will arise and that the management of the organisation will have to consider are:
 - What are our competitors doing and why might this be important for us?
 - What are our options do we have to address the loss of knowledge and expertise? Are they doing nothing, doing something? If it is 'something', what should we do/be doing?
 - How much will this cost?
 - Is it in the overall budget provision?
 - Will we get a return on investment?

- How will the goals be measured?
- Who will be held responsible if the programme fails?

2.15.1 Construction industry, knowledge and the Quantity Surveyor

In the construction industry, a newly-employed graduate may commence work with some trepidation. Four years of higher education and life in academia may not have prepared them for this impending challenge. Taking on new daily challenges and avoiding uncertainty has long been the subject of analysis by psychologists and psychiatrists. “Uncertainty avoidance can... be defined as the extent to which members of a culture feel threatened by uncertain or unknown situations” (Hofstede, 2001, p.161). A young construction professional commencing employment with a contractor or in a professional practice can offer little by way of immediate knowledge contribution to an organisation. Familiarisation may take months or even years depending on the organisation or project type. Some graduates may have undergone work experience either through block release, perhaps for a twelve-month posting or may have experienced summer employment in construction. These formative placements are an advantage in terms of tacit knowledge transfer and experiences which may last a lifetime for an impressionable trainee.

Graduates also bring their newly acquired explicit knowledge from higher education, which will equip them for some of the work-based tasks that they may be presented with. It is normal for a newly employed graduate to experience a degree of anxiety facing the largely unknown road ahead. This anxiety may be defined as a state of being uneasy or worried at what may happen and should not be confused with fear which has an object. Anxiety has no object. Uncertainty avoidance should not be confused with risk avoidance. Uncertainty is to risk avoidance what anxiety is to fear *i.e.*, both risk and fear are focused on an object or event. Uncertainty avoidance leads to a reduction in ambiguity (Hofstede, Hofstede and Minkov, 2010). Laws, rules and regulations are some of the tools used by society to prevent uncertainty. Construction organisations and construction professional practices are similar in this regard. A baseline of house rules or departmental rules are generally the accepted basis for a graduate to use as a barometer or checklist for their initial allocated tasks. This includes such items as punctuality, dress code, hygiene, acceptable and non-acceptable behaviour, respect, politeness, honesty, basic human benevolence towards others and a willingness to carry out the job with a degree of interest and rigour. While quantity surveying practices and procedures may be perceived as stoic and traditional, there is always room for innovation relating to new processes, methods and techniques.

Quantity Surveyors working in project teams are similar to what von Krogh *et al.*, Ichijo and Nonaka (2000) refer to as micro-communities. von Krogh *et al.* propose that when projects reach completion and the team is disbanded this accrued knowledge is often lost. The nature of the construction industry, with its emphasis on competitive tendering, especially in the public sector, does not allow sufficient time for the project team to reflect between projects. This limits the team's ability to utilise useful lessons learned for future project works (McCann, *op cit.*). Kreiner (2002) pointed out that while there is abundant published material on knowledge management, it is not an easy task to manage tacit knowledge.

QS graduates largely depend on their employers for training and knowledge transfer arrangements. There are many ways to transfer knowledge in a professional setting. The method adopted depends on the type of knowledge to be transferred, whether it is explicit or tacit. A suggested strategy is to identify the various methods and then use them appropriately for the given situation (Calixto, *op cit.*).

A selection of six tested and validated methods for knowledge transfer includes the following:

- Job Shadowing Assignments: A senior experienced employee is paired with a junior or less experienced employee. This assignment is usually over a short period of time and should be closely monitored by senior staff to ensure progress.
- Mentoring Programme: Mentoring programmes are over a longer term and usually focus on job performance rather than job competencies.
- Storytelling: This is an effective way of transferring tacit knowledge and allows an employee to narrate how a specific problem was resolved.
- Expert Interviews: This method of knowledge transfer focuses on the capture of knowledge from those who are due to retire. These sessions are usually recorded and are short in time and cover job competencies.
- Communities of Practice: these clusters of individuals collaborate to work through problems and methods of resolution adopted during various projects.
- After-Action Review: This may be a professional discussion group convened to discuss a near catastrophic event. The discussion will focus on how the event happened and how it could have been avoided.

Combining elements of the above with the explicit knowledge acquired in higher education, allows a graduate to become an informed professional. "The idea behind the knowledge-based view of an organisation is that the competitive dimension of what firms know how to do is to create and

transfer knowledge efficiently within an organisational context” (Kogut and Zander, *op cit.*, p.384). For individuals and organisations this knowledge transfer process must be captured, developed and shared effectively in all aspects of industry. This is a paramount objective for organisations to achieve improved performance, competitive advantage and innovation (Gupta *et al.*, 2004).

2.16 Conclusion

2.16.1 Overview of chapter

This chapter has highlighted and discussed the literature available on knowledge creation, management and transfer. The review considered the mass production of third level graduates, how barriers exist for learning and imparting critical knowledge, and how knowledge transfer is very often hindered to the detriment of graduate and employer alike. Information and communication technologies were discussed, and examples given of their relevance to solving communication problems. The knowledge cycle was also reviewed to illustrate how the iterative cycle commences with testing new knowledge and progresses through the various stages which ultimately leads to newly created knowledge.

The chapter explained how knowledge can be cultivated and created. It highlighted reflective thinking, making tacit knowledge explicit and how cultural change may become an impediment. Perseverance and repetition are especially important when trying to influence cultural change, because cultural habits are deeply engraved (Milton and Lambe, 2016).

The chapter examined the various techniques of how knowledge may be transferred, what knowledge transfer theories and frameworks exist and how knowledge workers may be motivated to share. Techniques such as instructional scaffolding, communities of practice and situated learning were discussed. New knowledge relevancy and prioritisation was explored. The chapter examined other professions and disciplines to seek out similarities. Professions such as legal, military, medical, management and film making were examined. The training programme for a Quantity Surveyor to achieve chartered surveyor status was reviewed as was the way the APC is structured to reflect the competencies required to meet strict professional guidelines and standards.

This chapter also analysed the dynamics of organisational and individual knowledge management and examined the values and virtues of mentoring and coaching programmes. It considered how the mentor and mentee relationship can grow and prosper with trust and confidence. The importance of asking relevant questions as a means to procuring knowledge and understanding was explored. This process examined the questioning procedures, accountability and eventually

how change can occur as a result of open and frank discussion. Finally, this chapter looked at the generational factors from baby boomers, Generation X and Generation Y (millennials) and how at this point in history (2020) all three generations with different experience, values and knowledge are potentially working together.

Through a chronological discussion on the emergence of various philosophical milestones this literature synthesis has shown how theory on tacit knowledge has evolved over time. This literature review and synthesis acts, to some extent, as a springboard to the remaining chapters on training, mentoring and transfer of knowledge management programmes. The thesis culminates in the development of a successful and meaningful monitored tutelage programme for quantity surveying graduates.

The final section of this review and synthesis of the literature draws together some of the discoveries that informed the work, made a difference in how it was approached and provided some continuing questions that informed the eventual outcomes. It is not proposed to repeat the literature citations here, except to include any that seemed especially significant or relevant.

2.16.2 Types of knowledge

The first discovery from this literature review was that there is a large body of theory about the theory of knowledge and its division into explicit and tacit forms. A variety of ways of thinking about tacit knowledge have been put forward by many authors. To this author, Polanyi's was the clearest. The review of the literature emphasised the importance of clarity in the definition of tacit knowledge and subsequently its management and transfer.

2.16.3 The management of tacit knowledge

The literature reinforced the idea that for an organisation, the recognition of what exactly tacit knowledge might be and its importance is not the only consideration. Use of tacit knowledge was shown to be an important way of contributing to the competitiveness and success of an organisation, and many authors supported this. In an organisational setting, the management of tacit knowledge becomes important as tacit knowledge is an attribute of an individual. If individuals leave the organisation and the tacit knowledge is not managed and transferred, it will be lost.

The management of tacit knowledge by an organisation boils down to recognising its importance and then managing its transfer from individuals who have acquired it to those who have not yet

been able to acquire it. This was usually because of lack of experience in facing the relevant challenges or working in the appropriate setting.

2.16.4 The transfer of tacit knowledge

Several theoretical bases for the transfer of tacit knowledge have been put forward. It is not proposed to repeat the literature citations of the review here, except to say that it seems clear that major contributors to these theories include Polanyi and Ryle. But these are only two amongst several. The existence of a large number of theories means that the topic has been carefully considered. Many authors have suggested, the transfer of tacit knowledge and the methods for it will depend on the type of tacit knowledge and the situations in which it is to be used and transferred. It was concluded from this discovery that a choice would need to be made about what was most likely to be the most suitable method for the transfer of tacit knowledge to graduate Quantity Surveyors.

2.16.5 Methods for the transfer of tacit knowledge

The literature review and synthesis showed that many methods for the transfer of tacit knowledge have been proposed and tried. Many examples were given. The question that arose from this was ‘which was likely to be the most suitable for the transfer of tacit information to graduate Quantity Surveyors?’

The examples ranged from traditional apprenticeships in established trades to the transfer of tacit knowledge in well-established professions such as Law, Medicine and the Military.

For professions such as Quantity Surveyors, the literature indicated that a model which appeared to provide a good chance of success in providing the basis of tacit knowledge transfer was the ‘community of practice’ model. This model implies that several individuals may be working on similar or the same organisational or project problems and are trying to achieve the same goals. At the same time, each individual has their own store of tacit knowledge. This can then be shared and built up in a ‘community of practice’.

The literature also showed that for the community of practice approach to be successful, two other concepts needed to be incorporated. These were a questioning environment or ethos and a high level of mutual trust. The literature demonstrated that organisations that were knowledge intensive were not as hierarchical as task-based organisations and so the notions of sharing and questioning should be easier to establish in such organisations. Quantity surveying is an example of such knowledge intensive activity.

Several examples of methods of tacit knowledge transfer using these ideas were cited in the reviewed literature. Those for knowledge-based workers all used some or a large degree of questioning and sharing. Questioning and sharing featured in the monitored tutelage programme for the transfer of tacit knowledge that was subsequently developed using an Action Research methodology. The Action Research methodology would not work well without a questioning and sharing approach.

For sharing and questioning to be successful strategies for the transfer of tacit knowledge there needed to be trust. Holste and Fields (2010) concluded that when it came to tacit knowledge sharing, employee's faith in the proficiency of their peers became the most fundamental issue.

A major contribution from the literature to the research carried out into the transfer of tacit knowledge to Quantity Surveyors was that of Calixto (2012). The eventual tacit knowledge transfer programme for Quantity Surveyors used elements of the Calixto's principles for establishing a knowledge transfer programme.

2.17 A reflection

The method eventually chosen for the transfer of tacit knowledge to recently qualified Quantity Surveyors was heavily influenced both directly and it must be said, tacitly, by the information discovered in the literature review.

The eventual method chosen and investigated was a monitored tutelage programme. The programme was investigated using the tools of an Action Research methodology. Underlying the whole programme were the ideas that first, an organisation and individuals recognised that they possessed tacit knowledge and that it would be in the interests of both to share it.

Once this was recognised, a method acceptable to all participants could be proposed. The method would need to be based on the transfer and sharing of tacit information. The participants would need to recognise the role of a questioning culture in this transfer and would need mutual trust if this were to work.

The eventual method of transfer used a monitored tutelage programme which was composed of a series of workshop and reflective breakout sessions. For these to work as a mechanism for the transfer of tacit knowledge the participants would have to question each other, and there would need to be mutual trust. The process would be assisted by chosen mentors who themselves would have experience and tacit knowledge in or associated with quantity surveying.

The tacit knowledge transfer process in a knowledge intensive organisation is always an ongoing one, so the transfer mechanism was organised using the tools of Action Research. This required *planning* (setting up the workshop), *action* (the workshop on a topic and with one or more presenters), *observation* (discussion and questioning subsequent to the workshop) and *reflection* (reflection amongst all participants about what was learned and what would be the next step). This process can be repeated and at each repetition stage more tacit knowledge can be transferred and also the tacit knowledge is kept up to date. This Action Research 'cycle' was based on the findings and principles discovered or established in this review and synthesis of literature.

CHAPTER 3

RESEARCH METHODOLOGY

Part 1: Reasoning behind the choice of research methodology and the philosophy of Action Research

3.1 Introduction

The literature review and synthesis of tacit knowledge, creation, management and transfer (See Chapter 2) identified a gap in existing literature. This gap pertained to research and literature about the transfer of tacit knowledge to recently graduated Quantity Surveyors and also about which method might be the most suitable to address this. This chapter further investigated a structured and monitored mentoring programme designed for construction graduates and more specifically Quantity Surveyors.

The construction industry is complex due to the unique nature of its output, the number of diverse professionals involved, investment intensity, pricing structure, the influence of government in the industry and the multiplier effect it has on other sectors (Ashworth and Hogg, 2002; Hillebrandt and Cannon, 1994). In order to research the usefulness of a bespoke mentoring programme the methodology requires a degree of flexibility and must have collaborative and participatory qualities. This chapter outlines and explains the research methodology adopted to address this complexity and tackle the research question, aims and objectives. This chapter also presents the research beliefs, credibility, philosophical stance, methodologies, caveats and limitations that are inherent in the methodology.

The research for this thesis emanated from an initial pilot workshop held mid-2015 in Dublin. The group consisted of four selected construction graduates and two retired managing directors of large Irish and international construction companies. The purpose of the workshop was to explore the industry's appetite for a monitored tutelage programme on the basis of group reactions and feedback. The overwhelming response from the workshop was a resounding positive appeal by all parties to establish a bespoke programme to tailor for the tacit knowledge training needs of construction professionals.

The next phase of the research was to examine how such a programme could address the tacit training needs of QS graduates. The outcomes from the earlier stages of such research influenced the choice and application of the research methodology that was eventually adopted. Chapter 4 contains an outline, analysis and summary of the results of a structured questionnaire. The

questionnaire was completed by a class of postgraduate construction professionals studying for a Diploma in Project Management at Trinity College Dublin in 2017. The class represented a broad range of postgraduate construction professionals. The final testing and validation phase for the research was to use the research data from the structured questionnaires in the sessions of the monitored tutelage programme (MTP).

3.2 Research aim, objectives and background

On the basis of a thorough review of the available literature, the identified knowledge gaps were studied and the addressing of these gaps has formed the basis of the research question, aims and objectives.

The research question is made up of three parts. It was set out in Chapter 1 and is repeated here.

The first question is, 'is there a gap in the current knowledge and literature about the transfer of tacit knowledge to recent graduates? The second is: 'is it possible to transfer relevant tacit knowledge from experienced professionals to recently graduated Quantity Surveyors?' And the third is: 'can this transfer be done as an effective and worthwhile process?'

The first part of the question has been addressed in the literature review. The answer is that 'yes there is a gap'. The answer to the second part is that 'yes it can'. This answer is based on the many studies, both theoretical and empirical, showing that tacit knowledge may be identified and transferred in a number of ways. The third part of the question is addressed later.

The aim and objectives of this research for a Professional Doctorate have been based on the information discovered from the literature review and the experience and tacit knowledge of the author over a 40-year career as a professional Quantity Surveyor.

Aim:

The aim is 'to develop a mentoring programme for graduate Quantity Surveyors to enhance tacit knowledge transfer from experienced professionals'. It is acknowledged here that the transfer of tacit knowledge, or any knowledge requires action by both 'transmitters' and 'receivers'. The process is not 'one way' or transmission only. It involves transmission of tacit knowledge in response to a perceived need by both experienced professional and recent recruits. The transfer of tacit knowledge is a continuing and reciprocating process. It was for this reason that an 'Action Research' approach was considered as likely to be useful. This is considered in more detail later. The overall conclusion of the research will be assessed in relation to the achievement of this aim.

Objectives:

The research has five aims and the conclusions from it will be based on the extent to which the research has achieved these objectives. The objectives are:

- (1) To review, evaluate and synthesise the literature on tacit knowledge creation, management and transfer for graduate Quantity Surveyors.
- (2) To analyse training techniques for graduate Quantity Surveyors.
- (3) Using Action Research methodology, to investigate possible strategies for knowledge retention, transfer and succession planning through a monitored tutelage programme.
- (4) To evaluate from the data generated and collected for the research, the positive and negative aspects of a monitored tutelage programme for graduate Quantity Surveyors using experienced professionals as tutors.
- (5) To analyse and appraise the potential restrictions and enabling factors of implementing a bespoke mentoring system. This aim stems from the research question ‘can the transfer of implicit knowledge be done as an effective and worthwhile process?’

3.3 Research focus and background

The experiences, both good and bad, of the researcher over a forty-year career period have resulted in a study focused on improving the lot of a graduate Quantity Surveyor. The assistance is in the form of the acceleration of a formal tacit knowledge transfer process not previously available in the construction industry. The research strategy chosen was one based on ‘action by doing’. This was chosen because of the tacit nature of the research topic. This approach put life-long lessons at the forefront of transfer of tacit knowledge from seasoned professionals to graduates. These ‘seasoned professionals’ were chosen because they had the proven experience and confidence to take part in mentoring workshops. The research spanned three years and had three separate stages. *The first stage* was a pilot workshop. *The second stage* followed this pilot workshop and consisted of the administration of a structured questionnaire to the workshop participants. *The third and final stage* was a series of monitored workshops which were designed to deliver the knowledge transfer and address the identified gaps in knowledge.

The focus of this research resides in the ‘built environment’ discipline which covers the worlds of architecture, engineering and surveying. Built environment research has been defined as multi-disciplinary as it covers human and organisational management, as well as areas of technology and environment. Ahmed and Opoku (2016) defined built environment research as promoting innovative thinking and problem-solving issues surrounding the environments created by humans

and for human activities. Built environment research can be related to infrastructure projects, urban spaces or buildings. Academic research in applied disciplines such as project management or other built-environment professions has the dual mission of generating theoretical and conceptual knowledge and simultaneously contributing to the solution of a practical problem (Azhar, Ahmad and Sein, 2010). According to Azhar (2007), collaboration between researchers and industry practitioners can ensure that the research results will be acceptable and applicable to the industry.

3.4 Research paradigm

All research which truly contributes to the body of knowledge can only do so using a paradigm which is based on a philosophical perspective. Considering and incorporating the various philosophical assumptions in the design of the research should have positive research quality outcomes, in the sense that it will follow a logical pathway to a defensible conclusion. A clear philosophical basis to the research also supports the researcher's assumptions and beliefs about the encouragement of the creation of new knowledge (Easterby-Smith, Thorpe and Jackson, 2012). From a researcher's perspective, deciding which paradigm best locates or situates one's work is the first critical step in research methodology choice. The term 'paradigm' is derived from the science historian Kuhn and refers to a set of philosophical assumptions or expectations about being (ontology), how one can understand it (epistemology) and typically includes strategies (methodology) linked to these assumptions (Scott, 2016).

Paradigms are often referenced in relation to research methodologies. The term paradigm has a number of varying descriptions such as worldviews, epistemological positioning or stances and shared beliefs in a research field (Morgan, 2007). According to Guba and Lincoln (1994), research philosophy has three elements: ontology, epistemology and methodology. In social science research this is also referred to as the 'philosophy of knowledge trilogy' (Morgan, 2007).

Ontology is the researcher's approach to scientific inquiry. This is how we view ourselves and the nature of being (McNiff and Whitehead, 2002). Can reality be viewed objectively or is it purely the observer's subjective interpretation? "If a researcher is to be confident in his or her awareness of their ontological position from the outset, then their epistemological and methodological position will follow" (Grix, 2010, p.59).

Epistemology is the study of knowledge, what the researcher considers reliable and valid knowledge and how the researcher has come to possess this knowledge. Gill and Johnson (2010, p.191) commented on epistemology as follows: "how do we know what we know, whether or not

any claim including our own, made about the phenomena we are interested in is warranted... what is our theory of truth.”

Methodology is the procedural approach and research design applied to establish findings to a research question. It may refer to the procedures and design of a research study. Methodology may also be considered “as the philosophical framework within which the research is conducted or the foundation upon which the research is based” (Brown, 2006). Methodology may be based on an inductive, deductive or abductive approach. Grix (*op cit.*, p.179) writes that the approach is focused on “the logic of scientific inquiry; in particular with investigating the potentialities and limitations of particular techniques or procedures.”

3.5 Philosophical approach and justification

Whichever philosophical stance is ultimately chosen, it is important to declare this early on in research and display an understanding of its effect on data collection and analysis. The research journey is founded on the subjective accounts of individuals within their research environment (Scott, 2016). According to the available literature, the two main research philosophies are positivism and interpretivism. Positivism is generally acknowledged as the traditional philosophical approach to research and is founded on the justification for and observed value of the research subject matter. Interpretivism is an observation of human experiences and its impact on the research subject matter. Comparisons between positivism and interpretivism were rooted in the ontological issues of knowledge creation (Guba and Lincoln, *op cit.*). Later these comparisons were expanded and broadened to include axiology (Creswell, 1998), critical theory (Guba, 1990), post-positivism (Guba and Lincoln, *op cit.*) and participatory research (Lincoln and Guba, 2005). This led Morgan (*op cit.*) to describe all these comparables as meta-physics.

Table 3.1 shows how the Saunders and Thornhill, (2012) framework summarised Guba and Lincoln’s comparative assumptions of positivism and interpretivism in terms of their ontological, epistemological, axiological and methodological stance.

	Positivism	Interpretivism
Ontology	External, objective and independent of social actors	Socially constructed, subjective and may change
Epistemology <i>What constitutes acceptable knowledge</i>	Only observable phenomena can provide credible data and facts. Focus on causality and law-like generalisations, reducing phenomena to simplest elements.	Subjective meanings and social phenomena. Aim is to increase understanding. Focus upon the details of situation, a reality behind these details, subjective meanings and motivating actions.
Axiology <i>The role of values</i>	Research is undertaken in a value-free way. The researcher is independent of data and takes an objective stance.	Research is value bound, the researcher is part of what is being researched, cannot be separated and therefore will be subjective.
Methodology <i>Techniques used by researcher to discover knowledge</i>	Highly structured, hypotheses and deductions, large samples, measurement, quantitative but can also be qualitative.	Small samples, in-depth investigations to gather rich data from which ideas are induced and qualitative.

Table 3.1 Research Philosophy Assumptions (Saunders et al., 2012)

Positivism and interpretivism may be seen as a dichotomy on the basis that reality may be objectively observed while interpretivism believes that reality is socially constructed. (Creswell, 2013). Critics of positivism opine that management research is far too complex to be theorised by ‘definitive laws’ and for the researcher to exclude or ignore their own values may be impossible. According to Feilzer and Morgan, the researcher taking a more pragmatic stance has been missing from the Guba and Lincoln metaphysical debate (Feilzer, 2009; Morgan, *op cit.*). An alternative approach to the two paradigms discussed above is pragmatism. A pragmatic approach to research may offer the researcher a social science methodology. Logic employed in research is usually attributed to inductive reasoning, deductive reasoning or abductive reasoning. Inductive reasoning formulates theories based on facts and may be susceptible to reaching an incorrect conclusion if the facts prove to be false. Deductive reasoning, often referred to as ‘top-down reasoning’ is only interested in certainty and conforms to logic to guarantee a certain conclusion. Abductive reasoning provides ‘best guess or guesstimate’ to explain a set of observations, often referred to as bottom up logic and often suited to data sets that are incomplete.

In summary, with deductive reasoning the general rule is that the specific conclusion is always true. With inductive reasoning the general conclusion may be true. Whereas, with abductive reasoning from incomplete observations the best prediction or guess may be true (Saunders et al., *op cit.*). Saunders et al also believe that abductive reasoning is set to address weaknesses with

inductive and deductive reasoning approaches. Using abductive reasoning as an alternative overcomes these weaknesses by adopting a pragmatist perspective. In Table 3.2, the main distinctions between a pragmatic approach and the methodological stances of qualitative and quantitative research are summarised.

	Qualitative Approach	Quantitative Approach	Pragmatic Approach
Connection of theory to data	Induction	Deduction	Abduction
Relationship to research process	Subjectivity	Objectivity	Intersubjectivity
Inference from data	Context	Generality	Transferability

Table 3.2 *A pragmatic alternative to social science research methodology (Morgan, 2007)*

In Table 3.2:

(1) *Connection of theory to data*, the key difference between qualitative and quantitative data is the main distinction between inductive and deductive theory and practice. Both practice a one-way reasoning approach. However, with abductive reasoning the process continually goes back and forth between inductive and deductive reasoning, converting observations into theory and finally assessing those theories through action. Abductive reasoning sets out to define the simplest explanation for an observation. Unlike inductive and deductive reasoning, it sets out a finale which sets out of the ‘best available’ or ‘most likely’ explanation. This is usually plausible and instinctive. It is not necessarily a mathematical or logical conclusion. In a pragmatic way, action is the path to assess theory (Dewey, 1938; Argyris and Schon, 1996; Morgan, *op cit.*). Thus, abductive reasoning is the philosophical basis of the circular, iterative and additive process of the method of transfer of tacit knowledge set out in this thesis.

(2) *Relationship to research process*. Morgan maintains there is an artificial relationship between the researcher and the actual research, which is also the forced dichotomy between subjectivity and objectivity. From the positivist quantitative perspective, there is a need for the researcher to be independent from the research (Miles and Huberman, 1994). From the pragmatic stance, the intersubjectivity allows the researcher to be where and when they choose during the research process (Morgan, *op cit.*).

(3) *Inference from data*. A pragmatic approach is not restricted to knowledge that is context specific or generalisable. This pragmatic process works back and forth between specific

results and more generalisable implications. Morgan (*op cit.*) refers to this as *transferability*. Therefore, knowledge used in a specific case or project can be further applied in other appropriate circumstances.

Pragmatism may be defined as a tool for problem solving and results in practical use and successful analysis of the research subject matter (Burke, 2007). Pragmatism avoids the contentious issues of the nature of reality and truth, accepting that reality can be singular or multiple with both open to empirical inquiry (Feilzer, *op cit.*). For pragmatists the main focus is to solve real world problems by focusing on research questions and objectives (Rorty, 1999; Morgan, *op cit.*; Creswell, 2013).

Pragmatism first came to light in the United States around 1870 and its origins are generally attributed to Charles Sanders Peirce (1839-1914), William James (1842-1910) and John Dewey (1859-1952). It was Peirce who developed the idea that inquiry depends on ‘real doubt’. He further contended that our carefully thought-out beliefs are really rules for action. These three individuals, (Peirce, James and Dewey), are regarded as the founding fathers of pragmatism. Social science research largely ignored the philosophy of pragmatism for many years, but it has regained popularity more recently, (Creswell, *op cit.*). While it was Peirce who is credited with naming ‘Pragmatism’, it has an older origin as demonstrated by Emerson.

“Our life is an apprenticeship to the truth that around every circle another can be drawn; that there is no end in nature, but every end is a beginning; that there is always another dawn risen on mid-noon, and under every deep a lower deep opens.” (Emerson, 1841, p.403).

Rorty further declared: “The democratic community of Dewey’s dreams is a community in which everybody thinks that it is human solidarity, rather than knowledge of something not merely human, that really matters”. Dewey went on to call pragmatism “the philosophy of democracy, a hopeful, melioristic and experimental frame of mind” (Rorty, *op cit.*, p.20, 24).

In an interview with Richard Rorty in 2003, Peter Reason declared that most Action Researchers would agree that “We cannot regard truth as a goal of inquiry. The purpose of inquiry is to achieve agreement among human beings about what to do; to bring consensus on the end to be achieved and the means to be used to achieve those ends. Inquiry that does not achieve co-ordination of behaviour is not inquiry but simply wordplay.” Reason was anxious to identify the link between pragmatism and Action Research. The “characteristic idea of philosophical pragmatism is that ideas and practices should be judged in terms of their usefulness, workability, and practicality and that these are the criteria of their truth, rightness and value.” (Rorty, *op cit.*, p.xxv). Rorty’s source

is John Dewey, whose philosophy focused on the question of ‘how life should be lived’ and how we should address the social issues of the day.

3.6 Action Research as a chosen methodology

Qualitative research methodologies including case study research and phenomenology lack the levels of participatory and collaborative action required for the research into methods of transfer of tacit knowledge.

The author considered several qualitative research methodologies before settling on Action Research. Methodologies such as case study method, phenomenology and ethnography were researched and considered. The case study method and phenomenology were considered to lack the levels of participatory and collaborative action required for the research into methods of transfer of tacit knowledge. Ethnography was also considered but it runs the risk of being considered unobtrusive. But the Action Research empowers obtrusive change. To support and comply with the aim and objectives of this thesis, the researcher’s preference was for a qualitative, participative, collaborative and possibly cyclical approach to the research.

The chosen methodology involved collaboration with graduates, mentors and organisations, diagnosing problems, designing solutions, implementing change and evaluating the entire process in iterative cycles. The suggested methodology is Action Research as originally coined by Moreno, promoted by Dewey and later credited to Kurt Lewin in 1945. Lewin was first to develop a theory of Action Research that made it a respectable form of research in the social sciences. He espoused that knowledge should be created from the process of solving problems in real-life situations (Herr and Anderson, 2015). Action Research is also a process in which people interact together and learn with and from one another in order to better understand their practices and situations and to take purposeful action to improve them (McNiff, 2013). This approach is founded on the notion that organisations may be understood experientially through processes of deliberate change (Coghlan and Brannick, 2014). There is an old Irish Gaelic saying ‘*Is ar scáth a chéile a mhairimid*’ which translates as ‘we live in the shelter of each other’. With the use of Action Research, the participants will work collaboratively peer to peer under the supervision of a tutor to solve project problems and to reflect on the suggested solution to prevent the problem re-occurring.

What Schon (*op cit.*) referred to as ‘the organisational swampy lowlands’ is insider Action Research inquiry or what one may experience backstage in an organisation. Argyris (1990 and 2010) offered further suggestions that organisations often experience an inertia by repeated use of previously proven ways of doing things. Action science is largely associated with Chris Argyris

who stated that his central concern was the ability of organisations to learn. He saw organisations as self-correcting systems where communication is central to change (Herr and Anderson, 2015). Upward communication for difficult situations is often lacking. People within organisations may not behave reasonably and ‘budget games’ are at times a necessary evil. Argyris asks why people produce, adhere to and proliferate errors, which eat up precious time and energy. His answer is to focus on people’s theories of action. These theories of action are mental maps about how to act in certain situations involving the way we plan, implement and review our actions. In the context of strategy and operations new organisational graduates will confront regular challenges in their early working lives (Coghlan and Brannick, *op cit.*). “Issues of organisational concern, such as systems improvement, organisational learning and change management are all suitable subjects for insider Action Research, since (a) they are real events which must be managed in real time, (b) they provide opportunities for both action and learning and (c) they can contribute to the development of theory.” (Coghlan, 2007, p.294).

McNiff encourages researchers to plan their Action Research in a systematic way. The system is first, identify a research issue; second, formulate a research question; third, explain why the issue is important; fourth, monitor and gather data; fifth, generate evidence; sixth, state the findings so far; seventh, test the legitimacy of the results; eighth, explain the implications of the research; ninth, (and finally), decide on potential future action. Action Research is thus philosophically based, sequentially organised and follows a clear logical pathway. It is thus suitable for doctoral research.

“Both managerial and research processes are uncertain and risky, and necessarily entail considerable self-initiated endeavour involving co-operation with others and skill in managing all the factors inherent in finding and implementing solutions to complex problems.” (Gill and Johnson, *op cit.*, p.10). Action Research expects us to stop going through the motions, just because we have always done it that way before. The two goals of Action Research are always “to solve a problem and to contribute to science” (Coghlan and Brannick, *op cit.*, p.11). Any action based on this research has the potential to transform the work we do, the working conditions we adhere to and most importantly the people who we are.

This qualitative research involved further direct engagement with, and investigation of, the experience of the social processes of the participants as set out by Burton and Steane (2004). It allowed a unique opportunity to gain an insight into the training and education needs of graduates and the problems associated with the organisational loss of tacit knowledge through retirement.

Action Researchers contend that their work is based on ways of knowing that go beyond the orthodox empirical and rational epistemology. Rorty believes “that Action Research returns the process of knowledge creation to the community of inquiry. He also believes in hope; hope of progress towards the ideal of liberal utopia whose ideals can be fulfilled by persuasion rather than by force, by reform rather than by revolution, by free and open encounters... Which has no purpose except freedom, no goal except a willingness to see how such encounters go and to abide by the outcome.” (Rorty, 1989, p.60). Rorty’s view as a philosopher is that it is not possible to bring truth and justice together in one language. Action Research does attempt to bring truth and justice together, but Action Research practitioners are scholar practitioners not philosophers (Reason and Bradbury, 2008).

Action Research, like most research is about the generation of knowledge. Many Action Researchers position themselves within the pragmatic paradigm. The Action Researcher’s mandate may be the development of strategies that illuminate the components of people’s social reality. This occurs through the researcher’s experiences and communication. The epistemology presents a view and justification for what can be regarded as knowledge. Unlike other research methodologies where knowledge is discovered through scientific means, Action Research is more subjective, personal and unique. “It is also the case that people learn best., more willingly, and apply what they have learned, when they do it themselves” (O’Brien, 2001).

According to Shalem and Slonimsky (2013) “the crux of professional knowledge lies in specialised ‘practice language’... which constitutes criteria for seeing distinctions and relations in the particulars of practice” and enable articulation between different reservoirs of knowledge. “Emulating what expert practitioners do in practice is not central to the development of professional knowledge of teaching” (Shalem and Slonimsky, *op cit.*, pp.67-70). They further state that their concern is more and more about personal reflection in and on practice rather than the acquisition of theoretical knowledge *per se*. This reflection is seen to be central to the acquisition of professional knowledge. Collin’s (2001) argument is that it is wrong to say that all tacit knowledge can or cannot be made explicit. In the author’s view this is true of many forms of tacit knowledge in the construction industry. Transferring tacit or implied knowledge to explicit is dependent on the degree of tacitness and how easy it may be to explicitly explain the knowledge or capture it for codification.

Collecting valid and reliable data during research can be a complex exercise. It involves gaining permissions from gate keepers and individuals, “conducting a good qualitative sampling strategy,

developing means for recording information both digitally and on paper, storing the data, and anticipating ethical issues that may arise” (Creswell, *op cit.*, p.145). The means of collecting data at the various stages of research is examined later in this chapter.

3.7 The choice of Action Research as a research methodology

From the early stages of this research the goal has been to investigate how the process of tacit knowledge transfer for Quantity Surveyors can be improved. The goal has been to achieve this through collaborative tangible change. This will make a difference for the individual and organisation alike. The goal has never been to focus on a legacy for the sake of change but to create a workable and useful tool for future new graduates to develop and build on. Action, therefore, is a key to both the research itself and the implementation of the research findings. Selecting Action Research has several benefits. First, it provides “practical solutions to practical problems; it allowed practitioners to be involved in the research and to engage in learning from questioning their own attitude and behaviours”. Third, it allows both the researcher and the practitioners to develop interpersonal skills, which allow the researcher “to become immersed in the research process and engage in personal learning” (O’Leary, 2011). Action Research may create a space or forum for collective reflection, as it did with this research. The choice of Action Research provides multiple means of comprehending knowledge and “integrates everyday experience and academic knowledge” (Reason and McArdle, *op cit.*, p.3).

The methodologies adopted for this research therefore involve (i) action, (ii) research and (iii) ultimately learning.

3.7.1 Action Research as a research methodology

Action Research is not a research methodology in the strictest sense. It is more an orientation to inquiry and this research is influenced by Action Research ideas. In many ways it links practice and ideas to serve human flourishing (Reason and Bradbury, *op cit.*). Action Research challenges organisations to change in a positive way through stakeholder engagement and participation, typically through the ‘plan, act, observe and reflection’ cycle of iterative actions, referred to as the Kolb cycle in Figure 3.1. It is an evolving process initiated by stakeholder eagerness to change organisational activities by people working together.

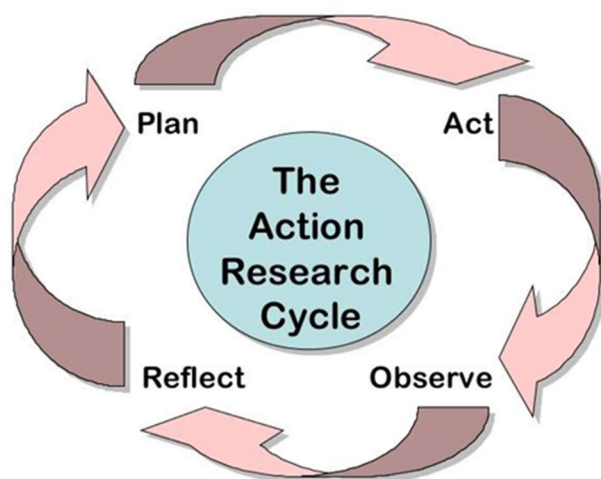


Figure 3.1 The Action Research cycle (Kolb, 1976)

The principles of action remain unchanged and can vary from a micro Action Research project to much larger ones lasting as long as 40 years. An example of a micro Action Research project would be a single schoolteacher working with children applying Action Research cyclical actions to improve the children’s educational knowledge by positive action. Large macro Action Research project examples include a forty-year long project in Scandinavia, developing and improving the quality of working life. This project uses participatory Action Research involving government, industry and unions (Gustavsen, 2008). It has been successful in sociological terms and has influenced civil rights, anti-racism and feminism. It has also allowed communities to develop and prosper.

An approach to research such as an action methodology seems to offer an appropriate framework within which to explore and understand the assessment practices for Built Environment academics. The exploratory nature of an action methodology suggests and justifies the relevance of a reflective practice and a practice-based approach. Therefore, the underpinning assumption is that in research ‘thinking and doing’ are continuously interrelated. Research through communications and observations with third parties encourages Action Researchers to continually make informal evaluations of what it is that they do. This approach can offer an embedded approach to reflection and may ultimately lead to change and improvement (Ahmed *et al.*, *op cit.*).

From the point of view of this doctoral research, the goal has never changed. It has always been to produce a pragmatic MTP for everlasting life-learning in iterative cycles, never concluding always evolving. Pragmatic, positive and effective actions are required in a changing world. Traditionally this transfer of knowledge was from lessons learned and from past experiences. While this experience is good, there is also a need for specific tacit knowledge gleaned from experience and

from people dealing with the current action in real-time. The iterative cyclical process is detailed in Figure 3.2. This spiral depicts how mentoring information via workshops can be refined, honed and relaunched with further workshops to support tacit training for graduates.

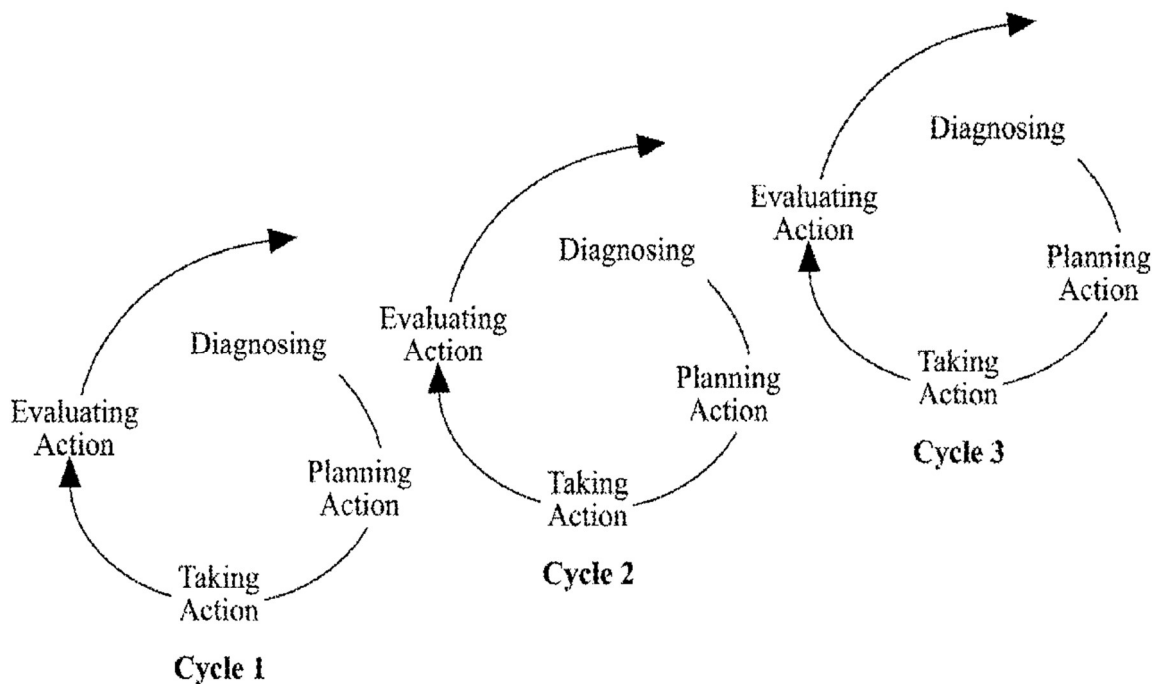


Figure 3.2 *Spiral of Action Research (Coghlan and Brannick, 2014)*

There are many definitions of Action Research. In the author’s opinion, the following are the clearest and most concise:

- (1) “Action Research is ‘a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes... It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities” (Reason and Bradbury, 2001, pp.1-4).
- (2) According to Bryman (2012, p.709) “Action Research is an approach in which the researcher and a client collaborate in the diagnosis of a problem and in the development of a solution based on that diagnosis”. Action Research is not a panacea for research problems and solutions. Some researchers and clients or organisations may find Action Research too intrusive and time-consuming (McCann, 2017).

The five characteristics of Bryman’s definition are shown in Figure 3.3.

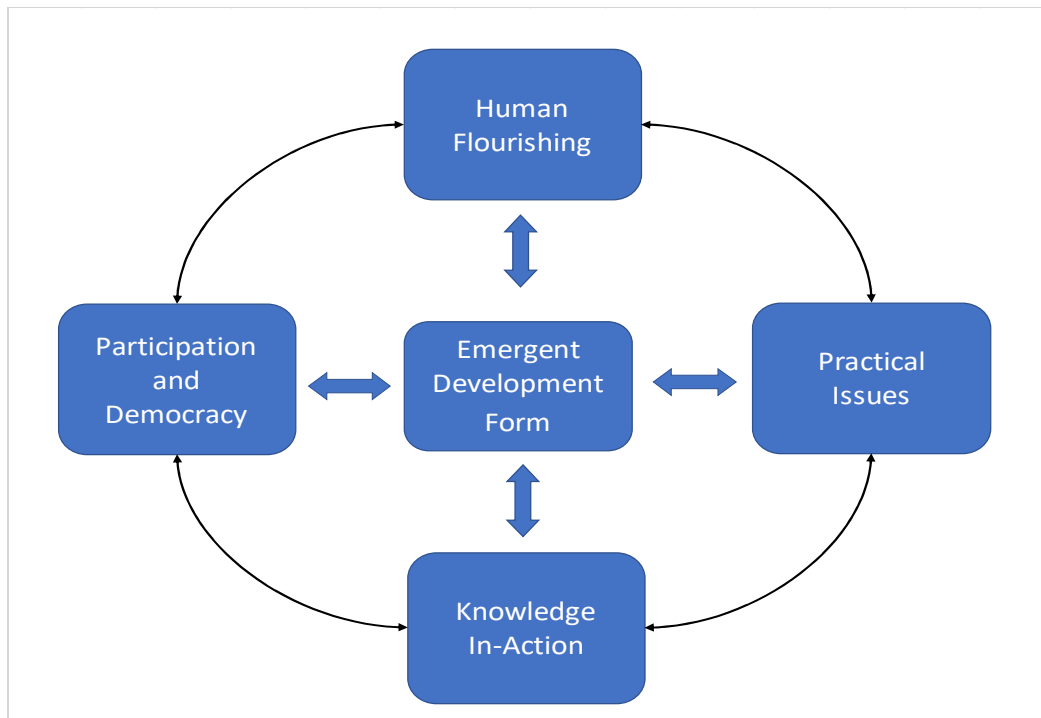


Figure 3.3 Five Characteristics of Action Research (Reason and Bradbury, 2013)

These characteristics are interdependent. They are all participatory actions.

Reason and Bradbury (*op cit.*) say Action Research knowledge in a working context is a transformation through conversation and experience to create useful actions, leaving the co-inquirers stronger as a result. The virtue of Action Research is responsiveness. This is what allows unpromising beginnings to become effective endings (Dick, 1997).

Coghlan also defines Action Research as an emergent inquiry process where data may change as a result of the researcher's intervention. It may not be possible to predict or foresee what will ultimately take place. The action of inquiry may be a constant evolving process. As with this research topic the focus in Action Research is related to real organisational change. Complementary to this change it may also generate real and robust knowledge. Collaboration with the stakeholders is paramount and the inquiry takes place in the present tense (Coghlan and Shani, 2017).

According to Burnes and Cooke (2012) Action Research is a collaborative and interventionist form of research and is firmly grounded in the Lewinian roots of scholarship and practice. Lewin's priority was not only to develop an inquiry process; it also had to possess the capability of change and flexibility (Coghlan and Shani, 2014). Coghlan and Shani further assert that there are two assumptions which form the cornerstone of the Action Research process. One is that the participants are learners involved in their own learning journey and the other is Lewin's principle

that ‘one only understands a system when one tries to change it’. It is the collaborative relationship between the behavioural scientist-researcher and the client where exploring issues and generating data contributes to participative organisational change (Coghlan and Shani, 2014).

3.7.2 Action Research Analysis

According to Coghlan (2019), Action Research traditionally starts with an existing practical problem or issue with which there is concern. It need not start with a theory and a review of literature. Initial questions when formulating an Action Research project include: what do we need to activate and address this problem, and will it benefit practitioners and scholars? From this unfolding action the Action Research project emerges and evolves as a process of inquiry encompassing organisational and behavioural knowledge. This embedded knowledge may be with management, stakeholders, peers and colleagues. Action Research can be defined as follows: “an emergent inquiry process it engages in an unfolding story, where data shift as a consequence of intervention and where it is not possible to predict or to control what takes place. It focuses on real organisational problems or issues, rather than issues created particularly for the purposes of research. It operates in the people-in-systems domain and applied behavioral science knowledge is both engaged in and drawn upon.” (Shani and Pasmore, 1985, p. 439).

Shani and Pasmore also considered that four factors act as Action Research quality dimensions. These four factors are: (i) “context”, (ii) “quality of relationships”, (iii) “quality of the Action Research process itself” and (iv) “outcomes”.

Context: As Action Research generates localised theory through localised action, knowledge of context is critical. The context of the action refers to the external business, social and academic environment and to the internal local organisational and/or disciplinary environment of the organisation. Knowledge of the scholar context of prior research in the field of the particular proposed action is also necessary.

Quality of relationships: The quality of relationships between members and between researchers are paramount, research *with* rather than *on* or *for*. Hence the relationships need to be managed through building trust, facilitating honest conversations, concerns for other, equality of influence, realistic political management, and common language amongst other things.

Quality of the Action Research process itself: The quality of the Action Research process is grounded in the intertwining dual focus on both the action and the inquiry process as it is enacted

in the present as issues are constructed, action is planned, implemented and re-evaluated in continuous cycles rigorously enacted.

Outcomes: The dual outcomes of Action Research are (i) some level of sustainability, such as human, social, economic and ecological and (ii) the development of self-help and competencies out of the action. As this happens new knowledge is created which is useful for practitioners and robust for scholars.

According to Chandler and Torbert, if Action Research is to influence organisational change then it must act in the present. The interventionist research process must operate in the ‘here and now’ to be truly effective. Chandler and Torbert say that Action Research “builds on the past” and “takes place in the present with a view to shaping the future” Chandler and Torbert (2003).

By choosing to use Action Research tools for the establishment and running of the MTP workshops the researcher used problems and issues identified in the industry today. The approach builds on the experiences of selected experienced mentors to equip MTP participants with the tools to deal with similar issues in the future.

Action Research methodology has become popular with researchers, as it generates new knowledge through a series of iterative cycles. The learning aspect may involve the participants’ learning Action Research techniques, which they then try to implement in their own environment. After this they reflect on the effectiveness of the activity before considering iteration through the ‘plan, act, observe and reflect model’ (Scott, 2016).

Action Learning, which is different from and sometimes confused with Action Research, can be defined as ‘a group of people coming together regularly to help each other learn from their experiences’. It is based on the premise that learning is a process that can be developed when people are helped to reflect on their attitudes (Trehan and Pedler, 2009). Pedler (1991) further argues that Action Learning is an approach to the development of people in organisations which takes the task as the vehicle for learning. It is based on the premise that there is no learning without action and no sober and deliberate action without learning.

Zuber-Skerritt recommends that participants in an Action Learning set should use a research journal or log in a systematic process of:

1. Identifying the most significant events of the day for them personally and recording these in their diary.
2. Reflecting on these events and writing down what they have learned from them.

3. Recognising what they will do as a result of what they learned.

Recording reflections in a systematic diary helps qualitative researchers pick up lessons from practice (Kolb, 1984) and “become more effective and reflective practitioners” (Schon, *op cit.*). Reflection diaries are strong heuristic tools for reflection. By not using such a system or technique, our reflection is frequently passing, disappearing into the subconscious and becoming tacit knowledge (Zuber-Skerritt, 2009).

Part 2: Timeline of the Action Research process used in this thesis

3.8 Research and data collection programme for the Action Research in this thesis

The data collection process commenced in August 2015 and completed in January 2019. The three phases of data collection are set out in Figure 3.4.

The three stages of research consisted of:

- (1) A pilot workshop to test the appetite for a focused mentoring programme as a vehicle for transferring tacit knowledge to graduate Quantity Surveyors.
- (2) Administration of a semi-structured questionnaire to a class of postgraduate students in Trinity College Dublin.
- (3) The design and hosting of four workshop sessions. These included four breakout-feedback sessions with the candidates after each mentored workshop. The purpose of this was to glean any further research reaction.

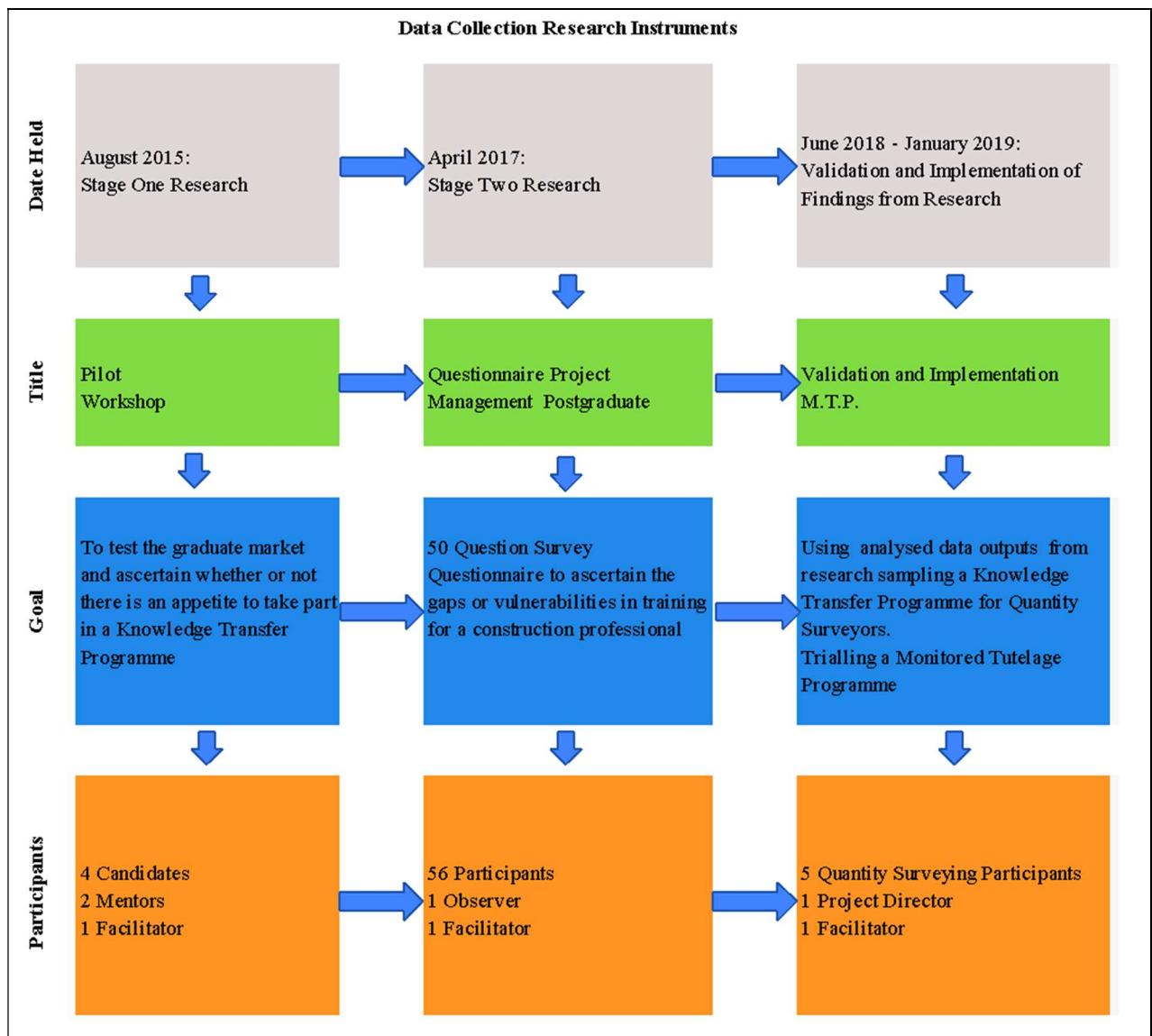


Figure 3.4 Data Collection Research Instruments (2018)

Workshop sessions were similar to Action Learning sets as each workshop had a facilitator and observer. The researcher used the embedded Action Research activity of ‘plan, act observe and reflect’ throughout the data collection programme. It was used to seek ‘on-the-job, current, live data’. All research participants were working in the construction management area and displayed a hunger for knowledge and training that was out of the ordinary. The findings discussed later will have the benefit that if an MTP is a worthy and workable bespoke mentoring programme then the recipients of the programme would have a significant input in designing the programme in the first place. This element appeared to be a positive attraction for the participants and will be discussed in greater detail later.

The research cycle spanned a four-year period with 70 participants yielding 2,800 pieces of data for analysis and discussion. Commonality throughout the three-part process included eagerness to

learn, unique interest in new forms of mentoring, the knowledge that the mentee may have confidential access to a bespoke mentor and energy to do something new and refreshing.

	Stage One Pilot Workshop	Stage Two Semi-structured Questionnaires	Stage Three MTP Workshops
Purpose of each Stage	<p>To test the industry with a select group of two experienced mentors and four postgraduate construction professionals.</p> <p>To assess the interest and appetite to participate in a MTP. Questioning the postgraduates through an agreed interview process with the researcher acting as a facilitator.</p> <p>Investigating and considering, following the workshop how to progress to the next phase of research.</p>	<p>To present and work with a group of 56 postgraduate construction professionals in Trinity College Dublin.</p> <p>To work through a semi-structured questionnaire of thought through questions. The session was followed by an open forum discussion to glean from the class through Humble Inquiry how best to progress from this secondary stage of research to the next research phase in a meaningful manner and compiling an agenda for helpful workshops.</p>	<p>To source a large quantity surveying practice willing to allow a select group of five postgraduate QS attend mentoring workshops in-house.</p> <p>The researcher interviewed all candidates and HR in advance. Using the gaps in tacit knowledge identified by the 56 Trinity College Dublin postgraduates as a basis for identifying an agreed mentoring programme of four workshops and four breakout sessions.</p> <p>Researcher acting as a facilitator invited a specialist mentor for each session.</p>
Contribution to Research	<p>The interest and energy evident from both the four postgraduates and the two experienced mentors highlighted the need for some form of a bespoke mentoring programme. This allowed the time and opportunity to consider how best a contribution could be made to progress to the next stage of research.</p>	<p>The large volume of data collected (2,800 pieces of data) was summarised and discussed in the thesis. The qualitative purpose enabled the identification of what tacit knowledge gaps were prevalent in the large group of post-graduate professionals.</p> <p>The open forum discussion contributed greatly to gleaning from the class in a more relaxed fashion what they would appreciate from an MTP.</p>	<p>Working closely with management, HR and five young, experienced postgraduate Quantity Surveyors greatly contributed to 'fine-tuning' the tacit knowledge requirement by members of the workshop.</p> <p>After each facilitated and supervised session the researcher held a break-out session to glean from the group via Humble Inquiry what they expected from the workshop and what they ultimately learned.</p>

<p style="text-align: center;">Data Collection and Approach</p>	<p>Data collected included notes from interviews performed by the two invited experienced mentors.</p> <p>Detailed notes taken by stenographer. Led to summaries of interviews which led to compilation of questionnaire content to advance to the next stage of research.</p>	<p>The 56 semi-structured questionnaires were analysed and summarised in chapter 4 of this research thesis.</p> <p>The purpose of assessing the response data was to shape and compile a workable MTP. These workshops were intended to 'fill in the gaps' of the agreed and identified tacit knowledge gaps.</p> <p>The informal open forum discussion greatly helped this inquiry process.</p>	<p>The data collected consisted of four presentation workshops where the gaps in tacit knowledge were addressed.</p> <p>The workshop headings included communication skills asking questions, how the 'other QS' does his/her job, greater site experience, greater sustainable knowledge programme, how other professions address such issues and effective succession planning.</p>
<p style="text-align: center;">Activity</p>	<p>One Pilot Workshop Session</p>	<p>Presentation to PM class. Compliance with ethical approval. Questionnaires (59) and open forum discussions.</p>	<p>Presentation to QS practice management and HR hosting 4 workshops and 4 breakout sessions.</p>

Table 3.3 Research Stages in the Action Research for this Thesis

Stage One

The pilot workshop consisted of four construction graduates, two of whom were contractor quantity surveying graduates, one consultant Quantity Surveyor and a services engineering graduate. They were interviewed by two experienced recently retired managing directors of large construction firms. The researcher acted as a facilitator for the workshop sessions.

The purpose of the first session was to glean from the graduates what assistance and guidance they needed (if any), from external experienced mentors and if they could see any benefit from such external support. Several commonalities existed in the graduates in areas such as continued training, lack of effective supervision, exposure to new projects and working conditions. From the mentors' points of view all graduates performed well. Some lacked confidence and communication skills in certain areas, which the mentors stressed would need to be addressed. In conclusion, the workshop was an initial first step to glean what type of problems the students had encountered and how best to tackle them in a professional way with the employer's support, the common goal being a satisfactory conclusion for all parties.

Stage Two

Research then progressed to accessing the views of sixty postgraduates, consisting of a class of architects, surveyors and engineers in Trinity College Dublin, studying for a diploma in project management. The college granted access to carry out a brief talk and PowerPoint presentation followed by a questionnaire/survey. This event was held in April 2017. The survey topic was: What help, guidance and assistance through internal or external mentoring would enhance specific areas of your professional development? This focus group of postgraduates helped confirm what the initial workshop had established, which was how employer organisations could improve the provision of training needs of graduates for the benefit of all concerned parties.

Stage Three

With the benefit of having established *what* can be done to assist graduate training and *how* such training and support can be implemented by mentoring, the next phase was to select participants for a learning workshop. This workshop was entitled a ‘monitored tutelage programme’ or ‘MTP’.

The purpose of the MTP workshops was to test and validate the knowledge gaps exposed in the first two data collection points.

The first step was to choose an organisation that was suitable and willing to participate in the programme. This step was critical as it enabled the creation of a platform for interrogating and analysing the data that had been collected in Stage Two of the research. The process involved meeting the CEO and HR Manager of the organisation to ascertain the possibility of the organisation submitting four or five graduate candidates who were suitable for participation in the workshop. Once the potential candidates had been selected, the next step was to interview them to establish their suitability and willingness to participate in the study. This step was only taken after the author had made a presentation to explain and clarify what would be involved in terms of content and time required. The organisation in which the graduate surveyors worked is a very large cost management and project management practice primarily based in Dublin and which manages large international projects.

The final pre-MTP process was to select suitable experienced mentors from industry to deliver the workshops. All chosen mentors were proposed by the author and agreed by the organisation in advance. It was agreed to hold four MTP workshops lasting two hours each with question and answer sessions at the conclusion stage. In between each MTP workshop a feedback break-out session was chaired by the researcher to ascertain and monitor progress on the workshops. The

commitment and support by the organisation, management and HR was crucial for the success of each workshop.

3.9 Action Learning and Action Research

Action Learning like Action Research is located in the human and social sciences domain. While the term “Action Learning” itself was not coined until 1972, the development of Action Learning from the late 1950's to the late 1980's is attributed to Reg Revans (1907-2003). Pedler writes that Revans owed a debt to John Dewey, the American philosopher and educationalist for his championing of pragmatism and experiential learning: “Action Learning is a working philosophy rather than a technique or practice” (Pedler, 2008, p.320).

Normally, four to eight people sit in an Action Learning set. They may not necessarily be from the same organisation or discipline. The group may be a set of peers with no mentor or coach. According to Pedler, Revans was suspicious of facilitation but, in practice, most learning sets have a facilitator. Real tasks or work problems are debated through questioning and the set’s objective is to resolve a challenging issue or work-related problem.

Action Research, attributed to Kurt Lewin (1890-1947), has been used extensively as a research methodology into educational and health issues. Koshy defined Action Research “as an enquiry, undertaken with rigor and understanding so as to constantly refine practice; the emerging evidence-based outcomes will then contribute to the researching practitioner’s continuing professional development.” (Koshy, 2010, p.2). The iterative cycle creates new knowledge conducted with specific and often practical problem solving.

Zuber-Skerritt (2001) maintains the main difference between Action Learning (AL) and Action Research (AR) is the difference between action and learning. Both include searching and problem solving and systematic inquiry. AR is more systematic, rigorous, scrutinised and verifiable. Dick (1997) stated that AR is a process by which change and understanding can be pursued at the same time. Often a facilitator is used to chair the set. Dick maintains that in AL each actor draws their own individual learning from the session, while in AR it is a collective experience to reflect upon and move on. According to Zuber-Skerritt (2009), Action Research may in the future become the most suitable research methodology for professional and organisational development, and the most applicable, due to the increasing rate of change globally. Organisations will no longer be able to rely on outside specialists or textbook knowledge which is rapidly out of date. Organisations will have to rely increasingly on the collaborative abilities of their own people to swiftly solve problems, to network internally, and to anticipate change. In this way, the people within the

organisation will be working together to position their organisation ahead of change and to take maximum advantage of it. In a fast-changing and competitive world both AL and AR can help people develop transferable skills, critical, analytical and creative thinking to act as catalytic members of innovative organisations (Zuber-Skerritt, 2009).

An MTP can be organised in the same fashion as Action Learning sets as originated by Revans but instead of four or eight individuals coming from different disciplines it can be organised as a set of similarly experienced individuals searching for tacit answers from mentors to enhance their training and skills in the workplace.

The Action Researcher Ortrun Zuber-Skerritt developed the acronym *ACTION* to encompass the principles of Action Research:

- A** Advancement of knowledge and learning
- C** Collaborative and Participative
- T** Truthfulness, respect and honesty
- I** Imagination in resolving a problem, challenge or dispute, thinking outside the box
- O** Openness
- N** Non-Positivist approach (positivist belief is that the only valid and legitimate knowledge is scientific in nature whereas Non-positivist is based on Nonaka and Takeuchi (1995) who espouse that knowledge comes in a variety of ways and to be practical it must integrate both explicit and tacit knowledge which include peoples' insights, intuitions and hunches.

In summary, advancement of knowledge and learning can be achieved through reflection on our actions, developing concepts and theories. The authors Kemmis and McTaggart (2000) emphasise the importance of self-reflection in the cycle: observation and reflection on actions taken, the process itself as well as on the outcomes.

3.10 Justification of Action Research as a research methodology

Having chosen Action Research as the most suitable research methodology for the research part of this thesis, the next stage was to procure and analyse information that was available outside the literature. The researcher focused on AR centres of excellence. These included The University of Bath and several Australian universities. In these institutions, Action Research has been a research specialisation, involving individuals such as Zuber-Skerritt, David Coghlan and Jean McNiff. A Doctoral workshop at UCD held in 2017 and subsequent sessions held in 2018 and 2019 were very useful in the formation of the programme of work for this thesis. The author was due to present at

the June 2020 Colloquium which was cancelled due to the COVID-19 pandemic. Details of a presentation by the author on Action Research at the 7th Colloquium (ARGI) are provided in Appendix 3.2.

3.11 Positionality

3.11.1 Positionality generally

The term ‘research positionality’ describes the different stances a researcher may adopt towards the research participants. The practitioner researcher may “see research as a way to deepen their own reflection on practice toward problem solving and professional development, as well as a way to generate knowledge from the inside out.” (Herr and Anderson, 2015, p.38). The positionality options in Action Research are generally ‘insider’ or ‘outsider’. The insider may be an organisational employee researching with his or her peers. The outsider is primarily external to the organisation, looking in. Insider/outsider team research can be described as a type of collaborative research where, inside the organisation, the practitioners are invested in the setting and must understand it to operate effectively within it. Outsiders, as the term suggests, enter the organisation on a temporary basis with the sole purpose of conducting research, meaning that their consequential settings are elsewhere (Bartunek and Louis, 1996). The outsider’s position may involve the researcher initially struggling with unfamiliar company jargon and protocol (Coghlan and Brannick, *op cit.*). There is the risk that the researcher unaccustomed to power-relationships may suffer unnecessary delays and may take some time to grapple with organisational politics. One suggested solution to avoid such problems is what Kurt Lewin referred to as the paradox of democracy, where one has to wield power to facilitate the others to empower themselves.

To minimise the potential difficulties of an outsider’s position in the research relationship O’Leary suggests three key areas of action and reflection (O’Leary, 2011):

1. Develop a critical awareness of one’s position within the group. This involves being reflective about one’s social identity within the group and to be aware how this might change.
2. Critically reflect on power within and outside the group. Ensure all participants’ views and voices are heard.
3. Focus on promoting positivity and developing trust in interactions with insiders. As an outsider the researcher must focus on developing trust, seek feedback from all, acknowledge one’s own limitations, clarify roles and decisions, respect diverse views, and accept there will be conflict. The outsider must be prepared to work on dealing with this conflict.

Jean McNiff pointed out that one of the most common mistakes researchers can make is not stating their positionality as researchers. They need to explain to all in the research, including the readers of final documentation, how the researcher positions themselves in the research field, whether as a participant, an external researcher or other (McNiff, 2013). The issue of what each participating stakeholder hopes to achieve from the research process needs to be carefully negotiated from the outset. Table 3.4 shows the four squares of knowledge.

<p>I</p> <p><i>We Know</i></p> <p><i>They Know</i></p>	<p>II</p> <p><i>We Don't Know</i></p> <p><i>They Know</i></p>
<p>III</p> <p><i>We Know</i></p> <p><i>They Don't Know</i></p>	<p>IV</p> <p><i>We Don't Know</i></p> <p><i>They Don't Know</i></p>

Table 3.4 Four Squares of Knowledge (Herr and Anderson, 2015)

When researchers enter a collaborative research process, they may see themselves in quadrant II, however “The goal of collaborative research is to reduce the tendencies of quadrants II and III and to expand quadrant I.” (Herr and Anderson, 2015, p.50).

3.11.2 Positionality specific to this research

Specifically, for this research the positionality is as follows: the researcher is an outsider working with participants/candidates as insiders and their organisational management as detailed in Table 3.5.

Personality of Researcher	Validity Criteria	Contributes to	Traditions
Outsider(s) in collaboration with insider(s)	Anderson & Herr (1999), Bradbury & Reason (2001), Heron (1996)	Knowledge base, Improved/critiqued practice, Organisational development/transformation	Mainstream change agency: consultancies, industry democracy, organisational learning (Paulo Freire)

Table 3.5 Continuum and Implications of Positionality (Herr and Anderson, 2015)

3.12 Appreciative Inquiry

As indicated previously, “Action Research is an orientation to inquiry rather than a methodology” (Reason and Bradbury, 2001). Among the sources and inspiration that have influenced this research was the advice and observations received from ARG1 in the open forum discussion. One comment by Coghlan was to consider Appreciative Inquiry as a research methodology (See Appendix 3.1 for detail).

3.13 Humble Inquiry

Humble Inquiry can be defined as “the fine art of drawing someone out, of asking questions to which you do not have the answer, of building a relationship based on curiosity and interest in the other person” (Schein, *op cit.*, p.2).

Schein further stated that the culture of not questioning is prevalent in several industries and professions. He cited the medical profession “where nurses and technicians do not feel safe either bringing negative information to doctors or correcting the decision of a doctor who is about to make a mistake” (Schein, *op cit.*, p.3). He discovered when doctors engage patients in one-way conversation, the depth of his or her questioning leads to their diagnosis. There may be others in attendance who for either cultural or protocol reasons do not intercede on the patient’s behalf.

In this doctoral research the inquiry process has been the cornerstone of the pilot workshop where all participants were interviewed to draw out these opinions. The next stage involved a class of 60 postgraduate construction professionals who participated in a semi-structured questionnaire. The last stage consisted of monitored workshops where attendees were asked to identify gaps in their tacit knowledge and how these gaps could be addressed by the use of a series of MTP workshops.

Questioning by superiors and subordinates cannot be ignored if matters, systems and processes are to be improved. It is critical that questions are seen as relevant, not purely critical, that they are open and fluid and the questioning process is not allowed to become argumentative.

Schein points out that professional questioners such as pollsters have, for many decades, framed questions in a way to get the answers in the form that they require. Therefore, questioning may be considered as both a science and an art. Le Baron Payne pointed out that respondents to questions are often not informed of the purpose of the question posed. “The respondent may feel flattered that we are asking his opinions, and his vanity probably adds to his willingness to be questioned” (Le Baron Payne, 1980, p.114).

Attendees at workshops and lectures want to invest their energies and time in listening. They do not want the information to be useless or boring. They want this new knowledge for the betterment of their progress and career. This is usually reflected in the degree of attention and enthusiasm in the forum. The best workshop results are often when the attendees go over the allocated time and request further time to elaborate or discuss various issues. This then leads to healthy and meaningful dialogue. There are many, mostly unwritten, rules of engagement regarding inquiry and questioning in the lecture and workshop scenario. The attendees are expected to sit and listen in an interested fashion displaying correct demeanour and respect towards the speaker. The speaker is expected to present in a dignified manner treating the topic and attendees with proper respect care and attention.

Fraternalising with the troops goes back centuries in military parlance where officers and ordinary soldiers would not socialise or dine together. This superior and subordinate culture is prevalent in many industries including construction. On construction sites professionals and managers generally do not mix or dine in the same canteen as the manual workers. This interpersonal relationship during downtime on site is both traditional and for many other reasons such as conversation, interests and sport. The result is that this peer-to-peer forum leads to a more relaxed environment for asking questions within one’s own peer group. People may feel less threatened and a culture of mutual trust may then prevail.

3.14 Reflection on Action Research stages

3.14.1 Reflective practices following each stage of research.

There are four recognised work-based learning reflection practices:

1. Learning Teams.

2. Journals.
3. Development Planning.
4. Relationship Development.

Two practices were examined for the MTP workshops. These practices were Learning Teams and journal keeping. Participants were asked to consider working together as a five-member knowledge learning team as a collective force to support each other in the learning process. Secondly, the researcher suggested they should each keep a journal to record the workshop and note any questions they may have for a later stage.

Box 3.1 Guidelines and suggestions for the reflection process.

- For the learning team members participating in the workshop this reflection process exists to help make sense of the experience.
- Discuss the practical dilemmas.
- Discuss relevancy or irrelevancy in participation.
- Was there a common experience through this learning process?
- Will participation assist in managing your own job/project problems?
- Have you a different perspective since the workshop?
- Is active listening as effective as active questioning? One suggestion on active listening is to paraphrase after the workshop what you got from the session. This process also allows for a degree of empathy which could promote and cultivate positive attitudes in the team.
- Would it assist the learning team if they met separate to discuss actual in-house dilemmas and how the workshop session findings may be applied to resolve such dilemmas?
- Discuss and tease out any grey areas and endeavour to resolve via discussion.
- Would external participants have assisted the workshop?

3.14.2 Learning Teams' Guidelines and Suggestions

As part of the MTP workshops the learning teams were provided with guidelines and suggestions to clarify the reflection process. These guidelines and suggestions are set out in Box 3.1.

3.14.3 Journal Guidelines and Suggestions

An individual's journal of events is also a reflective learning practice. It may be completed in private with an option to share should the writer so decide. It could be an important reflective tool

to record before, during and after the event. The writer may return to the script as often as required to supplement additional reflections.

Journal recording opportunities exist for individual projects, workshop sessions or everyday life. It is another tool or vehicle to help team members support reasoning, explore new methods and improve on the job skills.

The participants were given advice on keeping the journal and this advice is shown in Box 3.2.

Box 3.2 Advice on keeping a journal for reflection

- Try not to be judgmental. Focus on the context of the sessions.
- Examine one's own personal feelings and considerations both positive and negative. Consider checking with fellow members how they felt about certain aspects of the workshop event.
- Was the workshop revealing? Did participation result in change to your personal beliefs and understandings?
- If new tacit knowledge emerged, could you use it in future?

When the workshop session closed the members were asked to consider writing down their experiences both positive and negative. This allowed the revisiting of the journal as often as required to assess changes in perceptions and reflection.

3.15 Ethical approach for this research

Compliance with ethical guidelines and regulatory committees was a mandatory process during the compilation of this thesis. The author found this exercise helpful as it provided a cross check of compliance issues by an experienced panel of academics within the university. The points raised by the committee were relevant and guided the research at a critical time in the research journey. In retrospect the author benefitted from the guidelines which otherwise could have wasted a considerable amount of research time.

This research required three Ethical Approvals. First was the approval to hold the pilot workshops in August 2015. In the pilot workshops four construction graduates and two retired managing directors of large organisations were assembled to explore the need for a bespoke coaching and mentoring programme. A further role of the group was to explore the possible benefits that could arise from such a programme. In reality, the six attendees and the researcher did not delve into

organisational practices. They concentrated more on the individual graduate's training needs and gaps in their professional development.

The second Ethical Approval, sought in April 2017, was for a structured questionnaire involving a postgraduate class of 60 project management students in TCD. The EA was issued in mid-2018 (See Appendix 3.2). The structure of the questionnaire did not lend itself to prying into issues that were likely to be confidential or commercially threatening to the organisation but concentrated more on the individuals' experience and potential for MTP participation. A final EA was required for the eventual MTP session(s) with selected graduates from contracting and professional QS practices. This forum facilitated the possibility of opening up organisational practice training programmes. It allowed the monitoring of how an individual behaved and reacted to mentoring from an experienced industry professional.

The author was cognisant of maintaining good ethical practice from the outset of this research to include the following activities throughout the research process:

- Confidentiality of data collected
- Protection of participants during and after data collection
- Seeking to ensure that all participants were beneficiaries of this research
- Exercising respect, openness, and non-discrimination to all participants
- Displaying honesty and credibility during the research process
- Obtaining informed consent
- Communicating all the above to all participants from the outset
- Flexibility of research to comply with ethical guidelines

The author was aware from the outset of the research process that the final thesis must withstand rigorous examination on completion. The ultimate reporting of research findings may be peer-reviewed by scholarly journals and must withstand professional questioning and debate.

Ethical and credibility issues may arise from Action Research including commercial and personal findings and it may be necessary to go beyond anonymity by removing details that could identify an organisation or person involved (Coghlan and Brannick, 2014). This research investigated how graduates could be monitored, mentored, coached, encouraged and assisted by an improved managerial process. This process happened voluntarily. The graduate, now in responsible employment, must come of age and show maturity and adaptability in dealing with new processes.

In practice, most Action Researchers agree that the best way to understand organisational processes involves change. This involves a cyclical and iterative approach in order to change organisational and members' behaviour (Gill and Johnston, 2010). The Action Research goal is to seek authentic collaboration with others invested in constructing knowledge, ultimately adding to theory (Herr and Anderson, 2015). If the researcher, acting as an interventionist to improve the organisation or to implement change, finds that this helping process compromises the data, then the research should be halted or abandoned (Schein, 2013).

“Action Researchers need to move beyond reproducing relationships of consultation and tokenism” (Cahill, 2007). Action Research must possess a moral and ethical stance that recognises the improvement of human life as a goal (Noffke and Somekh, 1995). McNiff describes it as ‘those engaged in a form of morally committed action’ (McNiff, 1996). Boser adds that the democratic intentions do not obviate the need for thoughtful examinations of the ethical implications of the research (Boser, 2006). “Action Researchers dealing with sensitive issues such as child abuse or incarceration face a difficult ethical approval process where key ethical issues involve consent, confidentiality and ownership” (Chown, 2004, p.563).

3.16 Research Limitations

This research focused on the transfer of tacit knowledge from seasoned professionals to graduate Quantity Surveyors. Perhaps further research may be required on knowledge gaps of Quantity Surveyors more specifically because the semi-structured questionnaire concentrated on construction professionals generally. Some organisations may find an Action Research project too intrusive and possibly time consuming for their valued graduates to take part in.

Coghlan (*op cit.*) raises the issue that Action Research is cyclical, iterative and continuously evolving. Therefore, it may be difficult to know when to stop the research. He further points out that it may be difficult for Action Researchers to cease the constant tweaking of a research thesis and the decisive timeline may be that imposed by those managing the doctoral programme.

Action Research is not a quick fix solution to research. It has emerged over time that Action Research is suitable where research changes, as do organisations. New questions arise with these changes. This proves Action Researchers are not curtailed to programmatic ways and a degree of flexibility is evident (Boyd, 2018).

As a Chartered Quantity Surveyor, the researcher had to pay constant attention to and be self-aware of bias during the research process. At each MTP workshop the participants would air their

views on tacit knowledge requirements and the researcher had to be a facilitator rather than an experienced Chartered Quantity Surveyor. He also had to remain an impartial party to the research process. To act otherwise may have influenced the resultant research data and process.

3.17 Conclusion

This chapter commenced with the research aims and objectives and how this research methodology would allow effective and meaningful data to be collected and analysed for validation later. This qualitative research used pragmatism as its epistemological approach. It used it as a viable alternative for social science research, on an abductive and intersubjective approach to providing transferable knowledge.

This chapter explained the contribution to Action Research knowledge and the practicalities of carrying out cyclical research over a programme and process taking several years to complete. Chapter 3 also examined and discussed the ethical dilemmas experienced during research and the positionality of the researcher throughout the process. Appreciative Inquiry and Humble Inquiry were also presented as positive approaches to validation and testing data. Finally, research limitations were considered and discussed.

The academic contribution, *i.e.*, the addition to the body of knowledge, is in the form of applying an ‘action’ approach, in this case Action Research, to the process of the transfer of tacit knowledge in a knowledge-intensive industry, in which knowledge workers may work on related but different problems and in different (on site and practice) settings.

Several action modalities exist such as Action Research, Action Learning, Action Science and Action Inquiry with a wide variety of practices, benefits and purpose. Quantity Surveyors are the people with whom the knowledge sits in this research. They are at the heart of this study and they are used in this research as a type of case study.

The body of knowledge has also been added to because the method and modalities of the transfer of tacit knowledge were analysed in an application of Action Research. It was shown that this approach did allow the transfer of tacit knowledge between experienced and new knowledge workers.

CHAPTER 4

FINDINGS

4.1 Introduction

Chapter 3 outlined the choice of Action Research as the research methodology for this study. In order to apply the methodology appropriately, data collection took place in three stages. These stages were (i) the pilot workshop, (ii) administration of a questionnaire to 60 postgraduate project management students and (iii) validation and implementation of an MTP as a way of imparting tacit knowledge.

First, a pilot study was carried out. Later, a structured questionnaire was administered to postgraduate construction professionals. In order to develop an MTP from the research findings experienced mentors worked with quantity surveying graduates in a series of monitored workshops. Each phase of research emanated from the cyclical pattern of Action Research (See Figure 4.1) as detailed in the previous chapter.

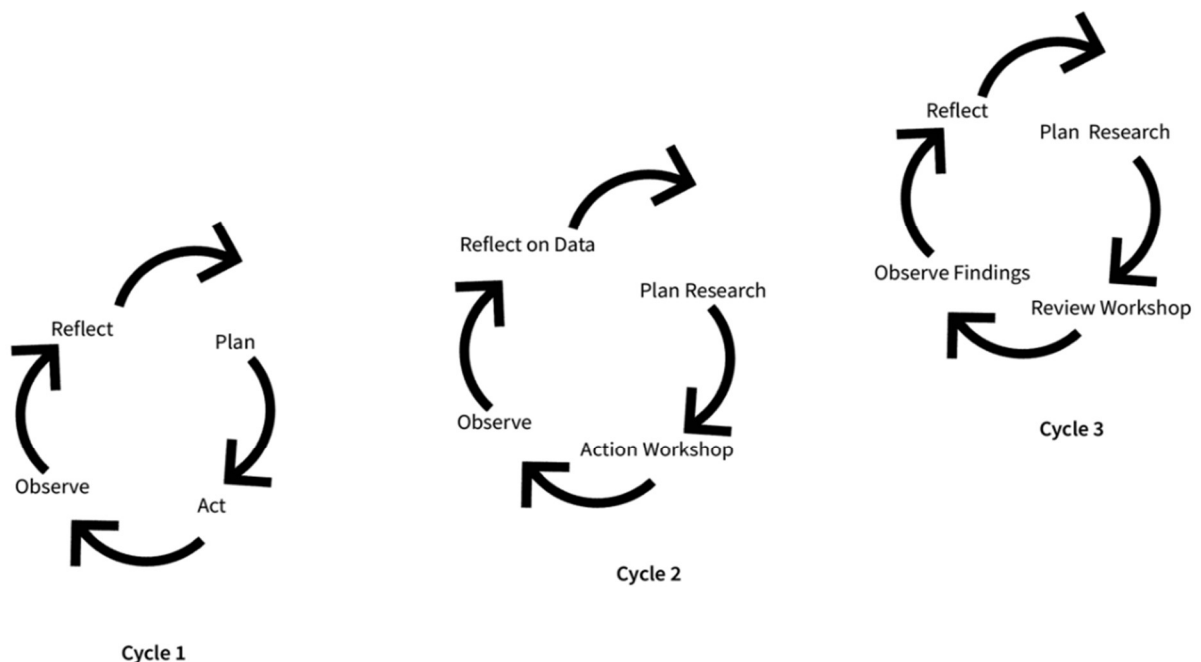


Figure 4.1 Action Research Iterative Cycles

This began with *planning* the research, including selection of candidates and justification of the sample selected. This was followed by *acting* out the workshop, questionnaire session and ultimately designing the mentoring workshops from the data collected. The next part of the cycle was *observing* the relevance and usefulness of the data collected and *observing* the reaction of all participants. The Action Research cycle was completed with *reflecting* on the data collected. It was then possible to progress to the next phase with this newly collected information. As with all

Action Research projects the activity does not have a termination point. The iterative cycles strengthen and increase in momentum as the research goals become more focused over time.

Figure 4.2 (repeated from Figure 3.4) shows the three stages from the initial pilot workshop as explained in the previous chapter through to the structured questionnaires and eventual implementation of the programme.

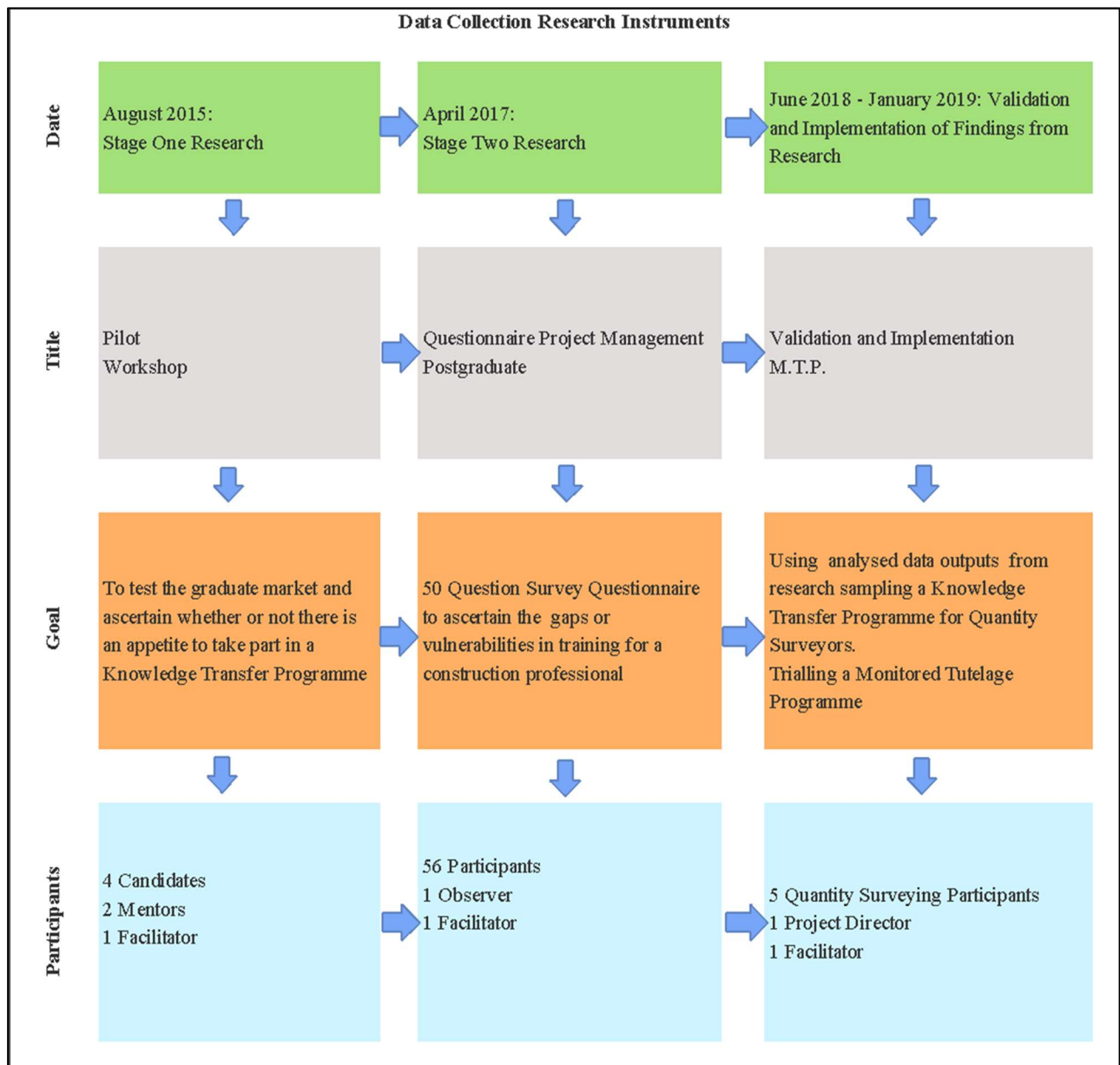


Figure 4.2 Data Collection Research Instruments

The initial workshop consisted of four selected candidates, the structured questionnaire consisted of a postgraduate class of 60 participants and the eventual MTP workshop programme consisted of five quantity surveying participants.

4.2 Pilot Study Initial Phase One Data Collection

A pilot study “helps to throw up some of the inevitable problems of converting your design into reality” (Robson, 2002, p.383). The pilot study workshop was held in August 2015 to establish if there was an appetite with construction graduates to participate in a knowledge transfer programme. The purpose was to discuss in an open forum whether the graduates saw any value in the practical benefits of such participation. It also allowed a discussion of any shortcomings of their employment induction and on the job training.

The workshop participants included the researcher acting as facilitator, two experienced directors (one retired and one about to retire) of large construction companies based in Ireland and four selected construction graduates. The graduate group consisted of two Quantity Surveyors, a construction site-based Quantity Surveyor and a graduate working with a large mechanical and electrical contracting firm dealing with tendering and bid management. The workshop lasted four hours off-site with an in-house stenographer producing detailed notes of the introduction and exit interviews plus the open forum session at the close of the session. The four graduates and both managing directors agreed that participation in a knowledge transfer programme such as an MTP would greatly benefit both the graduate and organisation alike. They added that it must be supervised and facilitated with a realistic goal-orientated programme. It was suggested from the outset that the programme would require relevant experts and realistic measurable goals.

The interviews were semi-structured allowing both mentors an opportunity to chat informally with each graduate but in a formal interview and recorded session. The final deliberation of both mentors, having carried out exit interviews with each individual candidate confirmed a degree of commonality in further training required. The mentors agreed that all candidates would greatly benefit from a monitored goal-driven training programme to enhance their:

1. Communication skills.
2. Knowledge of construction technology (site attendance).
3. Presentation skills to assist confidence building.
4. Troubleshooting sessions.
5. Leadership skills.
6. Analytical skills.
7. Learning by doing.
8. Contractual knowledge.
9. Knowledge of Alternative Dispute Resolution (ADR).
10. Working with a team dealing with project challenges.

The Pilot Workshop summary of interviews consisted of stenographer notes (See Appendix 4.1) and the researcher's contemporaneous notes. These dealt with the detailed observations of both attending mentors who suggested that the gaps in training of the four attendees as listed above needed to be addressed. This observation led to the framework of the questionnaire for phase two data collection.

The researcher held an exit interview with both mentors on completion of the pilot workshop. The ten listed areas above represent a consensus with the mentors and researcher of topics to include in further training workshops.

Having planned the initial workshop, conducted the interviews on the day with two experienced mentors, the researcher acting as a facilitator observed the interviews and responses and ultimately reflected on the findings to move on to the iterative cycle of the second phase of data collection.

4.3 Questionnaire with Postgraduate Project Management Students

Phase Two Data Collection

Phase two of the data collection was a detailed structured questionnaire followed by an open forum discussion utilising the knowledge acquired in the pilot workshop that a need for a programme existed. The chosen research group was a class of 60 postgraduate construction project management students in Trinity College Dublin. The reason for choosing a mixed class of construction professionals was to get an informed opinion from peer professionals. There is no recognised formal training for tacit knowledge specifically for Quantity Surveyors. The APC and CPD routes are selective and specific with clearly defined goals and designed standards. The bespoke MTP would require a cross-professional mix of all construction professions to attain a true picture of knowledge deficits. Questioning Quantity Surveyors in isolation could lead to APC and CPD training provisions and may not produce a useful tacit knowledge transfer opportunity, perhaps not possible with quantity surveying participants only.

Prior to distributing the questionnaire, the researcher met with the class one week earlier explaining the purpose and function of the questionnaire. On the morning of the questionnaire session, the Course Director spoke with the PM class and requested their full co-operation and attention to detail in filling out the questionnaire. This was followed by the researcher's ten-minute slide presentation (See Appendix 4.2). The contents of the slide presentation are outlined in Box 4.1.

Box 4.1 Outline of slide presentation to mix of 60 project management professionals before administration of questionnaire for Phase 2 of Action Research

- Questionnaire Explanation and Consent Form.
- The distributed questionnaire (Three-part, sections A to C, 50 questions in total) (See Appendix 4.3).
- What this questionnaire is about.
- Why this data is required.
- Why this PM class has been chosen.
- Why consent is required and important.
- Use of data collected and consent form.
- Once data is collected then the findings will be analysed to determine the format for establishing a Monitored Tutelage Programme.
- Trinity College Project Management Postgraduate Programme agreed to this questionnaire session taking place.
- A consent form was distributed and circulated to the class. Participants were allowed the option to withdraw from the questionnaire session at any stage.
- On completion and collection of the questionnaire the researcher conducted an open forum discussion with the class to debate training deficits in their careers to date.
- Outputs from this open forum discussion were compiled by contemporaneous notes for later analysis.

The class was told that all data collected would remain confidential; all returned questionnaires would remain anonymous and unsigned but would be numbered and coded when collected; the data would be stored under lock and key and the analysis would be stored on a password-protected computer at the researcher's home, accessed only by the researcher; data would be stored and archived for a minimum period of three years after graduate award. The class was then asked if had they any questions before commencement. The questionnaire session then took approximately 25 minutes to complete. Finally, the researcher thanked the participants, Trinity College Dublin and the PM Course Director for facilitating the questionnaire session.

This questionnaire related to knowledge management and knowledge transfer. This group of postgraduate students was selected to provide data to assess individual and organisational mentoring and training requirements to supplement tacit knowledge transfer. The prerequisite for entry to the Trinity College PM course is an upper second-class honours degree with relevant PM

practical experience in the construction or related industry. The researcher's twenty years' familiarity and association with this course has found that the participants formed a knowledgeable group of professionals with varying levels of practical and theoretical knowledge.

The questionnaire had three sections (See Appendix 4.3). These were:

1. General profile multiple choice questions (10 closed questions)
2. Questions relating to education and career development (30 yes/no questions)
3. Open questions allowing an opportunity to comment on individual and organisational training experiences (10 open questions)

The aim of the questionnaire was to support the development of a mentoring programme for graduate Quantity Surveyors as construction professionals which would enhance tacit knowledge transfer from seasoned professionals.

Following a PowerPoint presentation, the PM class were requested to sign a consent form if they chose to take part in the questionnaire session. Trinity College Dublin gave written consent to hold the research session and agreed that the Course Director would remain present in the PM class and supervise the session proceedings. This was to ensure the questionnaire was conducted properly and to the satisfaction of the College and the researcher. All sixty of the class members present signed the consent form, but four participants declined to take part in the session. A total of 56 out of 60 returned questionnaires. This gave a response rate of 93 percent.

4.4 Feedback and Findings Phase Two Research; Relevance and Purpose of Each Question

Section 1 – General Profile Questions 1.1 – 1.10

Q 1.1 Age Group – participants were asked to tick the box corresponding to their age group.

The purpose of this question was to assess the age categories of the participants and to later analyse the different experiences of the various age groups. This also assisted in determining the level of working knowledge and experiences. Of 56 participants none was over 50 years old.

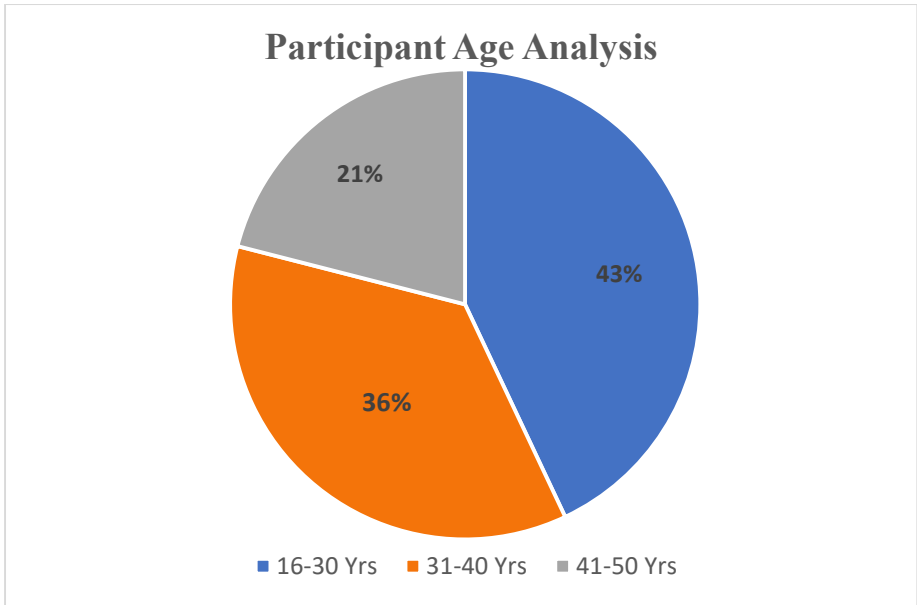


Figure 4.3 Participant Age Analysis

Q 1.2 Profession (Work Title) – participants were asked to tick the box containing the profession/work title most appropriate to them

The purpose of this question was to assess the variety of professions in the group and to later determine whether there was a difference in the training and mentoring experience between the various professions.

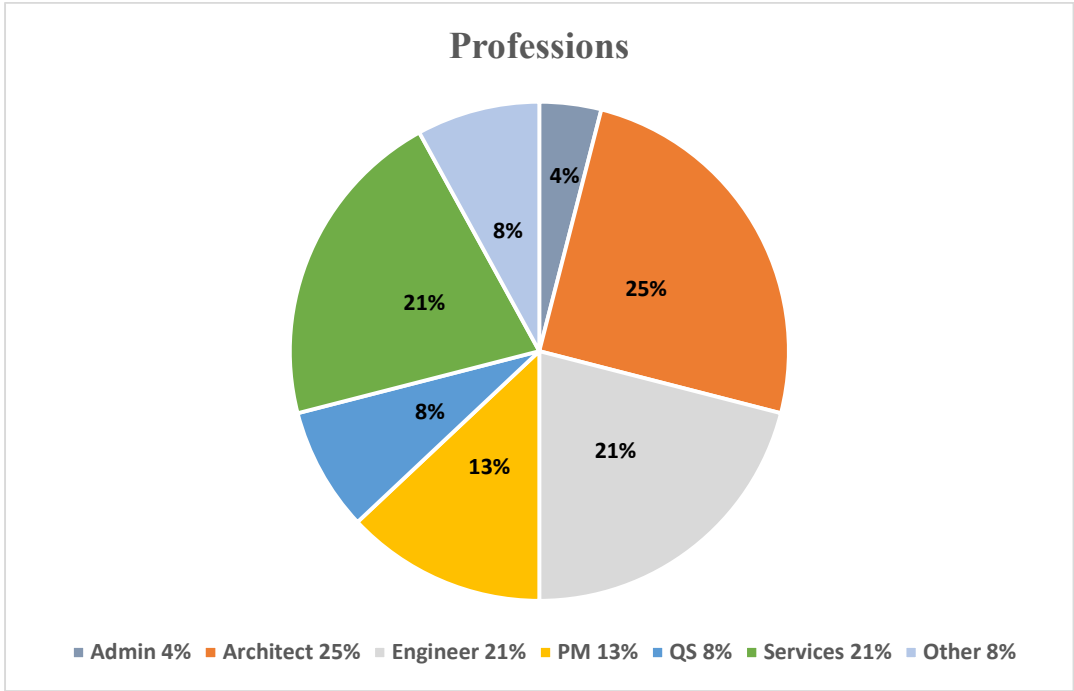


Figure 4.4 Proportions of respondents by profession (%)

Q 1.3 Education Level – Participants were asked to tick the highest academic level they have achieved

The purpose of this question: to assess the levels of academic achievement of the members of the group. The categories used refer to the Bologna Educational Credit System Level 7 (Pass Degree), Level 8 (Honours Degree), Level 9 (Master’s Degree) and Level 10 (Doctorate).

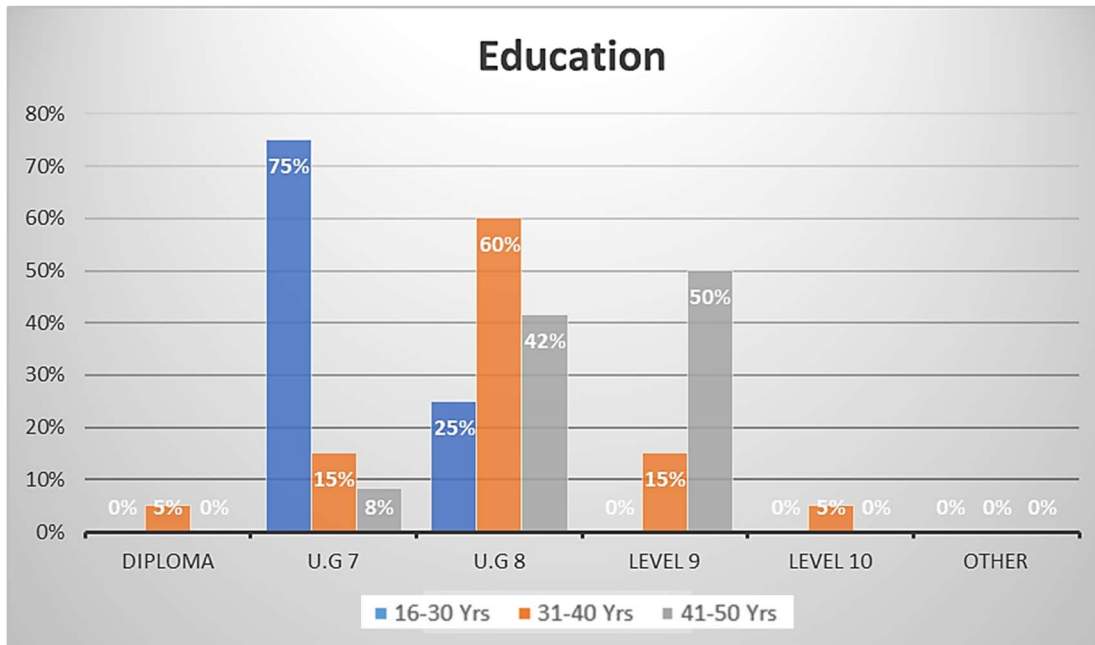


Figure 4.5 Level of educational attainment of respondents showing proportion (%) at each level

Q 1.4 Employment Status – Participants were asked to tick the relevant box to capture their current employment status

The purpose of this question was to determine respondents’ employment status when the questionnaire was administered.

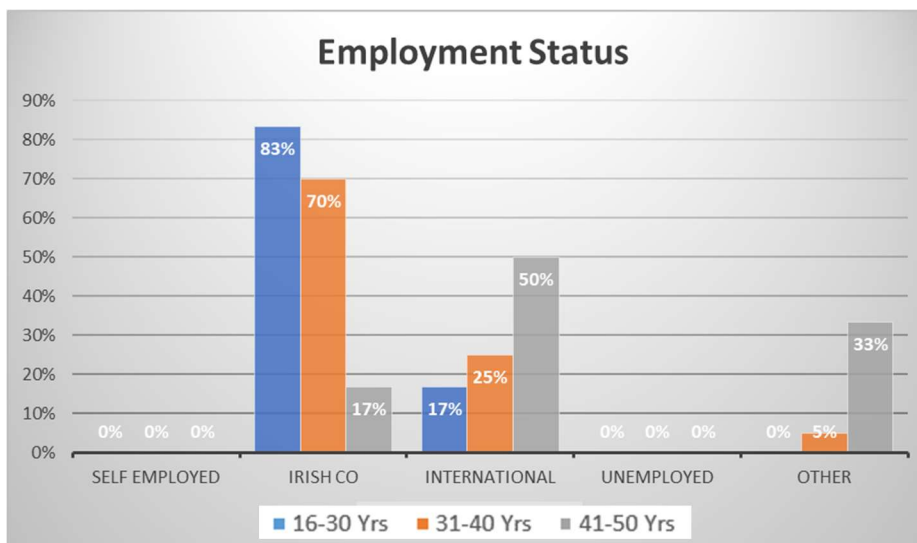


Figure 4.6 Employment Status of respondents by type of employment and proportion in it

Q 1.5 Work base location – Participants were asked to tick the relevant box to confirm their current work location type

The purpose of this question was to determine the proportions of the group that were site and/or office based.

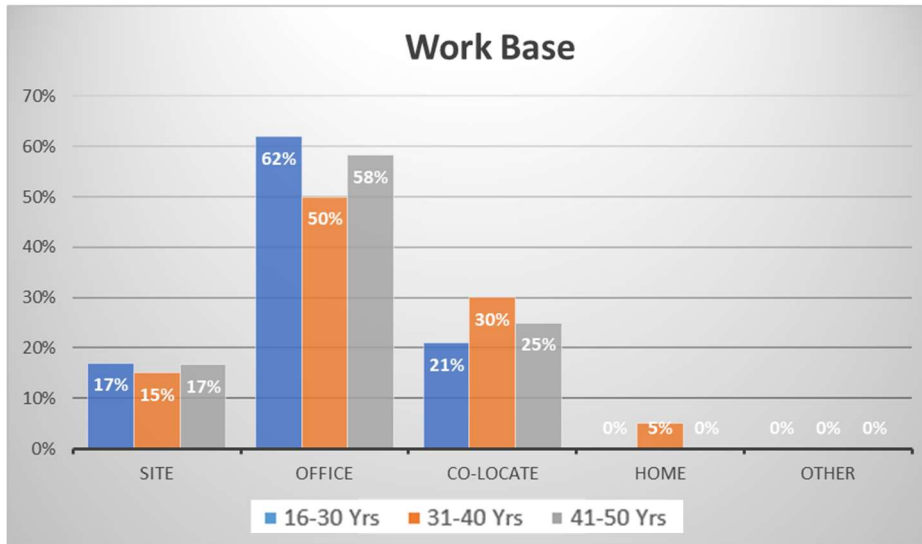


Figure 4.7 Work Base location of respondents by proportion and place

Q 1.6 Size of Organisation – Participants were asked to indicate the size of their current organisation

The purpose of this question was to determine the size of the organisation in which the respondent worked. It had already been determined in an earlier part of this dissertation that the transfer of tacit knowledge would be more difficult in a large organisation than in a small one.

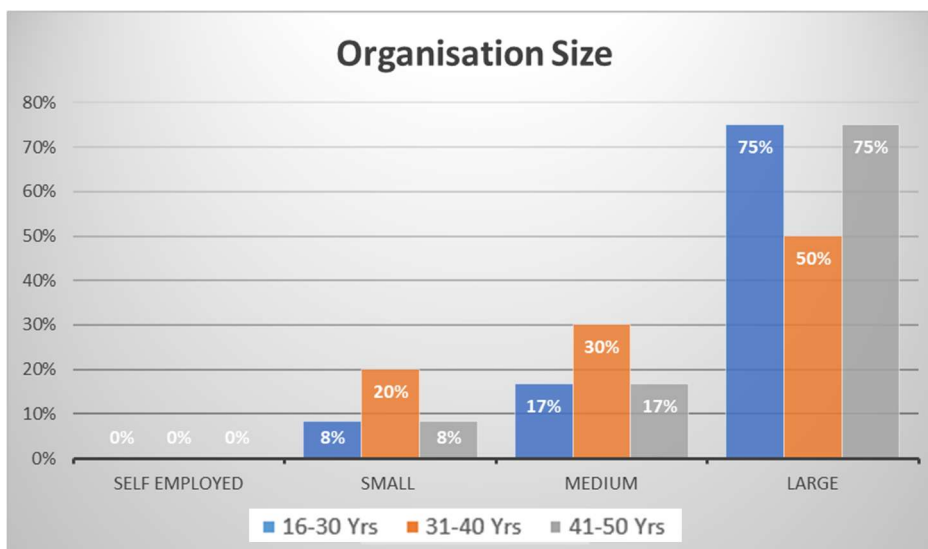


Figure 4.8 Size of Organisation in which respondents worked, by % of respondents

Q 1.7 Age of Organisation – Participants were asked to indicate how long their current organisation is in operation

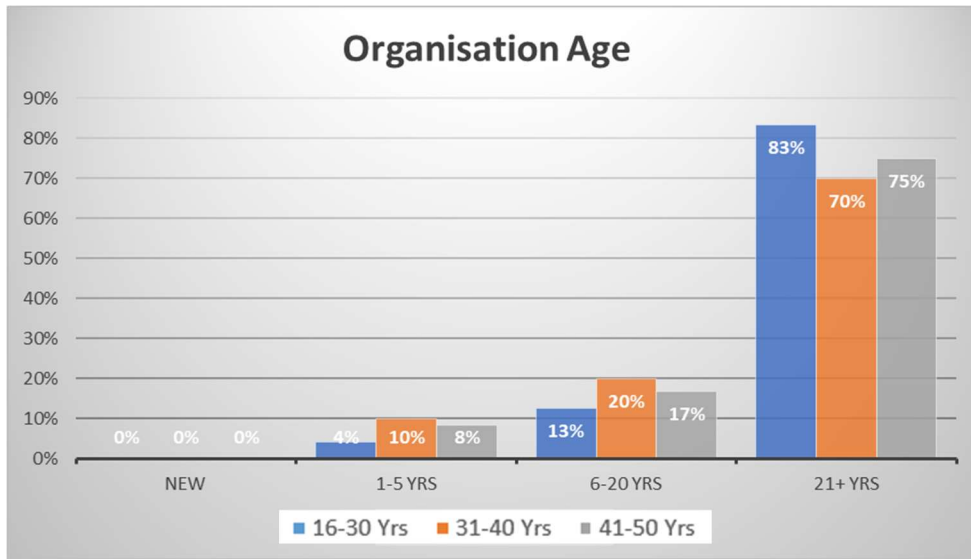


Figure 4.9 Age of the organisation for which respondents worked and % of organisations in each age category

Q 1.8 Participants were asked whether they networked with peers in their industry

The purpose of this question was to discover the level of networking experienced by members of the group. It formed the basis of a later question that was used to ascertain whether networking varied between the groups.

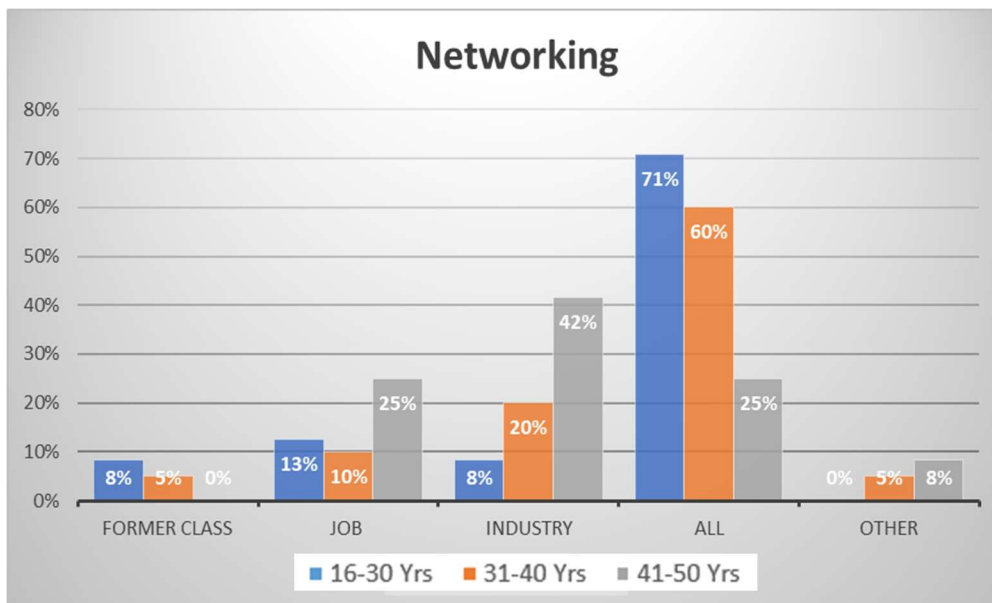


Figure 4.10 Networking contacts by type and by age group of respondents

Q1.9 Participants were asked what initially motivated them to follow current career path

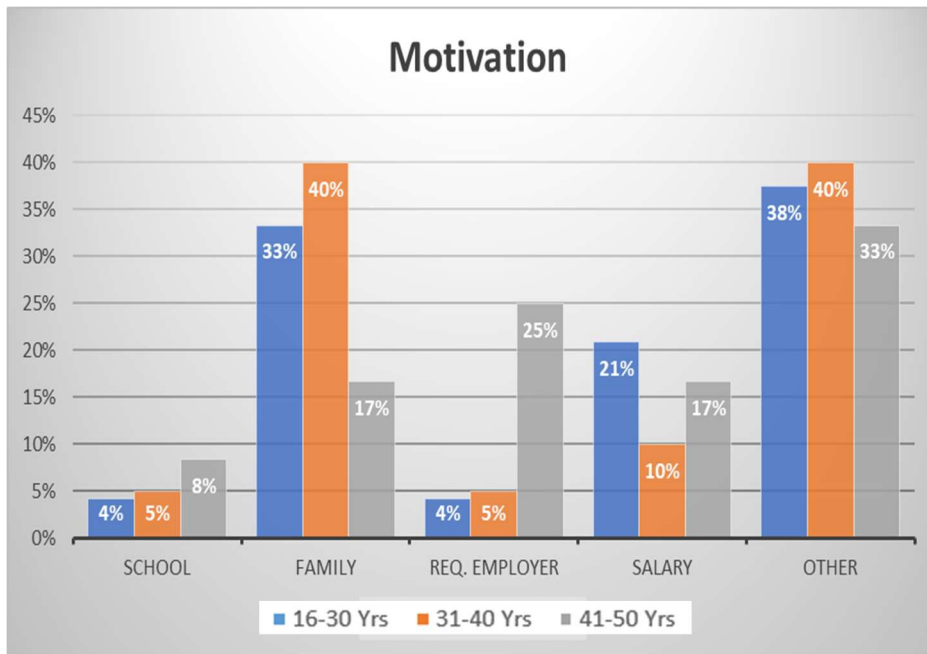


Figure 4.11 Initial motivating factors for current career path of respondents by age group

Q 1.10 Participants were asked had they experienced bullying

The purpose of this question was to determine whether bullying had occurred at any stage of the career development of the group of students on the project management course. It had already been established that bullying would make the transfer of tacit knowledge less likely.

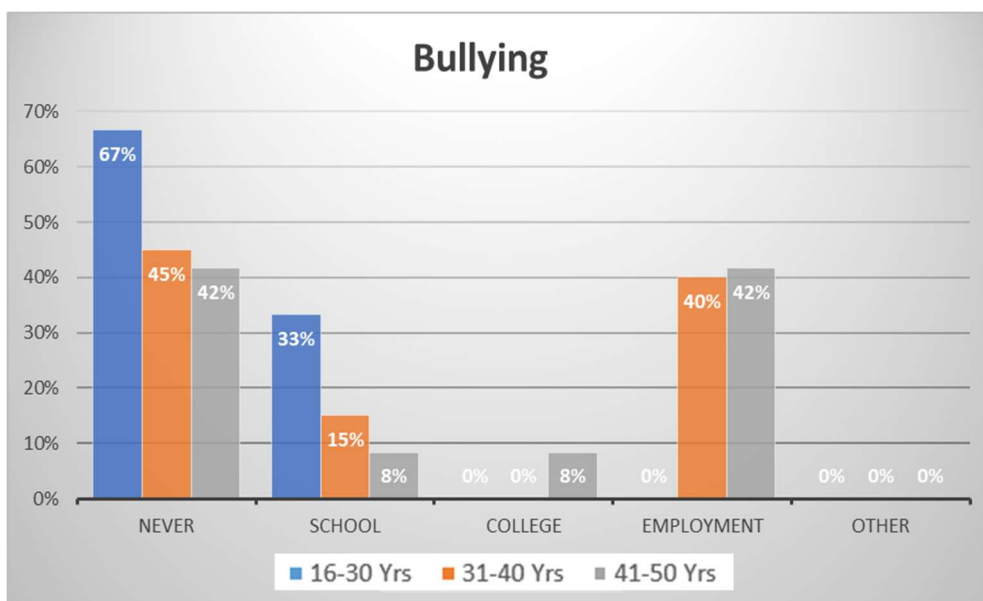


Figure 4.12 Incidence of bullying of respondents by age group and place of bullying

4.5 Summary of Initial Findings from Section 1 Questionnaire

The responses to questions 1.1 to 1.10 were collated and categorised.

Each data item was checked and considered by the researcher for relevance and inclusion in the findings. The data was structured so it could be used in the core Action Research cycles in the manner suggested by Coghlan and Brannick (2014). The summarised results for the responses to each question are outlined below.

- 1.1 Age Group: The responses showed that most of the group had graduated with a primary degree qualification at an average age of 23 years. The cumulative amassed knowledge in the group exceeded 600 years.
- 1.2 Profession: The PM class included an even spread of construction professions. The ‘other’ category included a construction lawyer and software developer specialising in construction.
- 1.3 Education Level: Assessing the individual categories of education based on education levels achieved, the cumulative years spent in higher education amounted to 230 years for the entire group, an average of just over four years per group member.
- 1.4 Employment Status: Most of the group were employed by Irish indigenous companies. The majority of the other more experienced categories were working with large international companies.
- 1.5 Work base location: 57 percent of the class (32 of the 56 participants) were not based on a construction site.
- 1.6 Organisation Size: 66 percent of the class (37 of the 56 participants) were employed by large organisations, employee numbers greater than 101.
- 1.7 Age of organisation: 77 percent of the group (43 of the 56 participants) were employed by organisations that had been in existence for 21 years or more.
- 1.8 Networking: 57 percent of the entire group (32 of 56 participants) networked with peers and colleagues at all levels.
- 1.9 There was an even spread of motivating reasons to work in the construction ‘other’ group which included – specific opportunity, life ambitions, passion and aptitude for working in construction. The ‘other’ group (21) made up 58 percent of the group of students who responded.

1.10 Over half the participants in the group, 32 out of 56 responded that they had experienced bullying in the workplace. Most of these were in the older categories, (31 to 50 years old). None of the younger participants, (up to and including 30 years), reported that that they had been bullied.

Section 2 – (Questions 2.1 – 2.30) Yes/No Questions (See Table 4.1)

The second compilation of questions consisted of 30 questions relating to:

- Academic qualifications (6 questions)
- New entrant induction process and introduction to duties (6 questions)
- Reaction with peer-to-peer supervisor and ‘go-to person’ (6 questions)
- On-site and off-site mentoring and training (6 questions)
- How training development could assist new graduates entering organisations (6 questions)

The responses to these 30 questions give an impression of what has happened to the training and knowledge acquisition of the class participants since they qualified as construction professionals. The responses from the group to this set of closed questions also indicates the appetite for further mentoring and coaching in the group. The set of questions also investigated preferences of the group for on-the-job training as opposed to external mentoring and training programmes. It opened up the discussion of how the participants dealt with project problems and their relationships with their peers when difficulties arose.

The replies to the set of closed questions also investigated the importance of communication skills to the class members since they had qualified. Their responses elucidate the ways in which they have managed to hone these skills since finding employment.

The questions finally asked how the participants’ experience, good or bad, during their training process could be of benefit to graduates in the future.

Section 2 – “Yes/No” Questions 2.1 – 2.30 – Candidates were asked to “please tick or circle the relevant box for each question”.

There were 30 questions in total in this section of the questionnaire.

Relates to: Academic qualifications and achievements	Relates to: new entrant induction procedure, formal or informal introduction to your department and duties following commencement of employment	Relates to: Interaction with Peer to Peer; Supervisor; Go to Person if/when project problems arise in your organisation	Relates to: On-site or Off-Site mentoring or training to supplement your work; external mentoring programme to support your decision making and knowledge management within your organisation.	Relates to: How your training and development experience could assist new graduates entering your organisation.
<p>2.1 – 2.6</p> <p>Purpose of questions: (6 questions) to determine how the level of education and academic training prepared the candidates for working in the construction industry. On completion of qualification did the candidate feel prepared and enthused for a successful career in the industry?</p>	<p>2.7 – 2.12</p> <p>Purpose of questions: (6 questions) to establish how effective the induction process, if any was for each candidate. Was there sufficient feedback from the induction process?</p>	<p>2.13 – 2.18</p> <p>Purpose of question: (6 questions) to establish when project problems arise then who would the candidate reach out to for a resolution? Are these problems resolved internally or externally via consultants?</p>	<p>2.19 – 2.24</p> <p>Purpose of question: (6 questions) to establish if the opportunity for in house mentoring is available to the candidates. To determine if a monitored tutelage programme existed would the candidate consider taking part in such a process?</p>	<p>2.25 – 2.30</p> <p>Purpose of question: (6 questions) to determine does the candidate’s organisation take part in ‘lessons learned’ sessions and would the candidate consider sharing their newly acquired knowledge with new work entrants?</p>

Table 4.1 Summary compilation of purposes of questions 2.1 – 2.30

Section 2 – 2.1 – 2.30: - Response to Questionnaire Survey

Relates to: Academic qualifications & achievements	Relates to: New Entrant Induction Procedure Formal or Informal introduction to your department & duties following Commencement of your employment	Relates to: Interaction with Peer to Peer; Supervisor; Go To Person if/when project problems arise in your organisation	Relates to: On Site or Off-Site mentoring or training to supplement your work; external mentoring programme to support your decision making and knowledge management within your organisation	Relates to: How your training and development experience could assist new graduates entering your organisation
2.1 On qualifying to your current status, are you adequately prepared for your employment tasks?	2.7 Did you receive a formal induction to your current organisation?	2.13 When project difficulties arise, do you resolve these issues yourself?	2.19 Did you receive regular upgrading and training to support decision making within your organisation?	2.25 Have you been consulted for your input on the design and development of a graduate induction programme?
41 Yes 73% 15 No 27%	36 Yes 64% 20 No 36%	31 Yes 55% 25 No 45%	32 Yes 57% 24 No 43%	14 Yes 25% 42 No 75%
2.2 Have you had relevant work placement experience prior to taking on your role as a professional?	2.8 Did you receive training to carry out your job/tasks?	2.14 When project difficulties arise do you resolve these issues by consulting with your peer to peer colleague(s)?	2.20 Is work related training and upgrading available in-house?	2.26 Would a "lessons learned" process assist in the prevention of procedural errors in projects?
37 Yes 66% 19 No 34%	29 Yes 52% 27 No 48%	52 Yes 93% 4 No 7%	31 Yes 55% 25 No 45%	54 Yes 96% 2 No 4%
2.3 Did the topic range in your academic qualification facilitate you to competently carry out your employment tasks?	2.9 Was the induction procedure consistent across all new inductees?	2.15 When project difficulties arise do you resolve these issues by consulting with your supervisor/employer/go-to person?	2.21 Would problem solving be more beneficial if solution training was shared with competitive/likeminded organisations?	2.27 Are adequate safeguards in place to ensure effective staff competency levels for carrying out significant project tasks?
28 Yes 50% 28 No 50%	25 Yes 45% 31 No 55%	49 Yes 88% 7 No 12%	48 Yes 86% 8 No 14%	23 Yes 41% 33 No 59%
2.4 Did you consider remaining in education prior to your first employment?	2.10 Did you have an input into the review and revision of the new entrant induction process?	2.16 When project difficulties arise do you resolve these issues by seeking a solution external to the organisation?	2.22 Is work related training and upgrading more beneficial from external training?	2.28 Would your recently acquired experience be of benefit to a new entrant or graduate co-participating in an external training programme?
21 Yes 38% 35 No 62%	7 Yes 13% 49 No 87%	28 Yes 50% 28 No 50%	42 Yes 75% 14 No 25%	53 Yes 95% 3 No 5%
2.5 On completion of your academic qualification, did you feel motivated and enthused to take on the challenge of your first employment role?	2.11 Did you receive feedback on your interview and induction performance?	2.17 Have your communication skills improved sufficiently since commencing your career?	2.23 If a Monitored Tutelage Programme (now explained) existed, would you consider taking part?	2.29 Do you stay in contact with ex colleagues and former peer groups?
48 Yes 86% 8 No 14%	9 Yes 16% 47 No 84%	49 Yes 88% 7 No 12%	47 Yes 84% 9 No 16%	47 Yes 88% 7 No 12%
2.6 Did you experience fear/trepidation on taking on your first employment role?	2.12 Would you consider a refresher induction process or assistance regular intervals?	2.18 If you have experienced an error during your employment, have you learned a lesson from that experience?	2.24 In your opinion do you contribute to the core competency of your organisation?	2.30 Do you plan to pursue further study in order to progress your knowledge base?
34 Yes 61% 22 No 39%	37 Yes 66% 19 No 34%	54 Yes 96% 2 No 4%	46 Yes 82% 10 No 18%	37 Yes 66% 19 No 34%

Table 4.2 Tabulated responses to questions 2.01 – 2.30. Findings in red

Section 3 – Open Questions 3.1 – 3.10

Question 3.1

In question 3, participants were asked to name one topic that, at this point in their career would, in their opinion, best benefit their professional development?

The purpose of this question was to find out the views of the members of the group about which topic they thought would, through training or mentoring most benefit their careers at this time.

The results of the question as extracted from 56 comment boxes are shown in Figure 4.13.

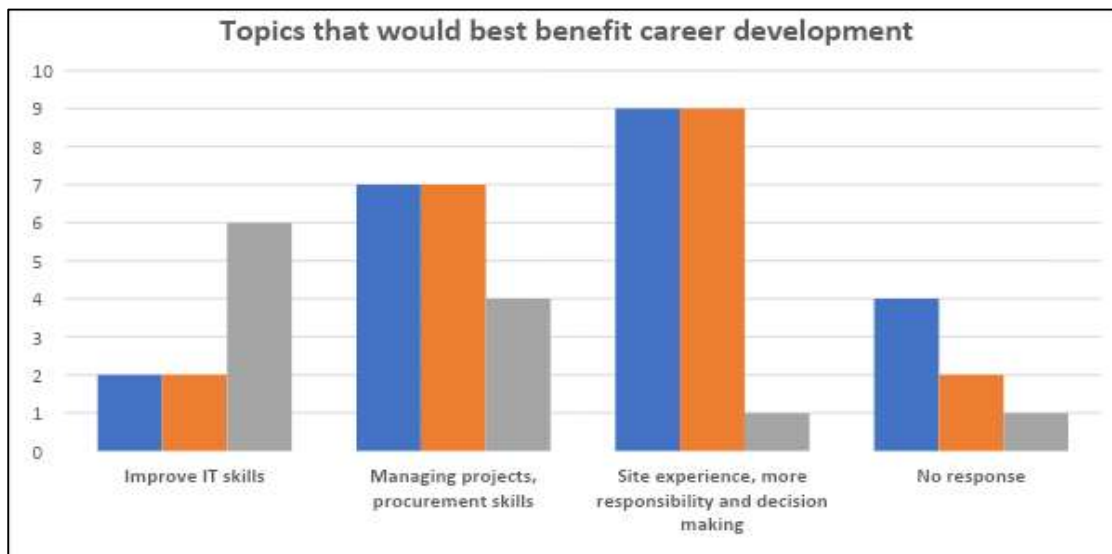


Figure 4.13 Summary of respondents' opinions of topics that would best benefit career development, by age category

The topics that those in the category, 30 years old and below (24 comments), thought would best benefit their career at this time were summarised as:

“topics such as accountancy knowledge, legal contractual aspects, assistance with further qualifications, greater communication skills, negotiation skills, how to analyse and price a job, real-life project experience, knowledge of planning regulations, understanding the bid process for jobs, more hands-on experience with tendering, more project management experience and greater responsibility.”

In the 31 to 40 years age category (20 comments) could be summarised as:

“greater IT skills, learning how to run a business, ability of how to price a job in detail, more PM experience, greater leadership skills, understanding of how (organisational)

decisions are made, more understanding of design aspects, greater site experience, more networking, lessons learned sessions, more responsibility in decision making process.”

In the 41 to 50 years age category (12 respondents), the comments were summarised as:

“more training, public speaking and communication skills, time allocation for training, improved negotiation skills and greater involvement in company decision making process.”

Question 3.2

In question 3.2, participants were asked, “as a postgraduate, what do you currently see as your greatest strength for your organisation?”

The purpose of this question was to prompt each candidate to consider what was their greatest strength or contribution to their employer organisation.

The results from this question as summarised by extracts from the comment boxes of the 56 returned questionnaires are shown below.

The attributes that the respondents thought were their greatest strengths, according to their age group are shown below.

In the 16 to 30 years age category, 24 out of 56 respondents stated that they considered their strengths were:

“...work rate and problem solving, motivation and willingness, not afraid to work hard, eager to learn, qualified and experienced skills, dedicated and determined, people skills, ambitious, capable of working independently, good work ethic, BIM knowledge, enthusiasm, fresh approach to work, multi-tasking and hardworking.”

In the 31 to 40 years age category 20 out of 56 respondents stated their strengths as:

“...capable of designing a project, practical knowledge, understanding of price and cost mechanisms, industry experience, commitment and attitude, ability to trouble-shoot and problem solve, variety of experience, broad knowledge base, communication and people-management skills, contractual and building knowledge, ability to learn and eager to work, good with people, deliver projects on time within budget, proactive, specialist project expertise and experience of cost managing projects.”

In the most senior age category, 41 to 50 years, 12 respondents stated their strengths as: (12 of 56 participants).

“...hard-earned leadership skills, ability to adapt and hit the road running, managing people and performance, wide knowledge base, relevant experience in bringing greater perspective to our organisation, specialist experience, getting things done, large development project experience and industry knowledge.”

Question 3.3

Participants were asked “as postgraduates, what do you currently see as your greatest weakness in your organisation?”

This question was asked so that the information provided by the responses could be used later to assist in determining how their perceived weaknesses could be addressed through training or mentoring.

The respondents in the 16 to 30 years age category (24 out of 56), indicated their greatest weaknesses as:

“...lack of qualification, little or no experience working with large organisation, lack of public works knowledge, frustration in workplace, lack of practical and site experience, focusing on too many tasks, need greater variety of experience, lack of confidence with technical issues, underutilisation of my qualification, confidence and communication due to lack of site experience, stuck in repetitive work role, unable to delegate, assigning tasks to older people, can’t say no and need more experience with new projects.”

Those in the 31 to 40 years age category, (20 out of 56) stated that their weaknesses were:

“...poor IT training, lack of regular site experience, time management skills, not given site experience, opportunity to take project from start to finish, role clarity in company, legal and contractual understanding, use of financial systems, intolerance of people non performing, incapable of managing workload, taking on project problems personally, no clear career path, demotivated with lack of opportunity, no link to board members, stuck in rut and need more training.”

Respondents in the 41 to 50 years age category (12 out of 56) perceived their weaknesses as

“...not given time to get to know staff, too much political interference, need better leadership skills, further qualification by staff leads to frustration at not using new skills,

lack of experience, client relationship management, fear of failure and fear of making mistakes.”

Question 3.4

In question 3.4, participants were asked if they thought that their organisation had a problem with the loss of critical knowledge. For example: ‘In-house’ expertise dealing with specific projects and challenges. If they answered ‘yes’ they were asked to elaborate. The purpose of this question was to test what loss of individual knowledge to each candidate’s organisation could be addressed by training or mentoring.

The results, which consist of extracts from 56 comment boxes of the returned questionnaires, are summarised below and organised by age category.

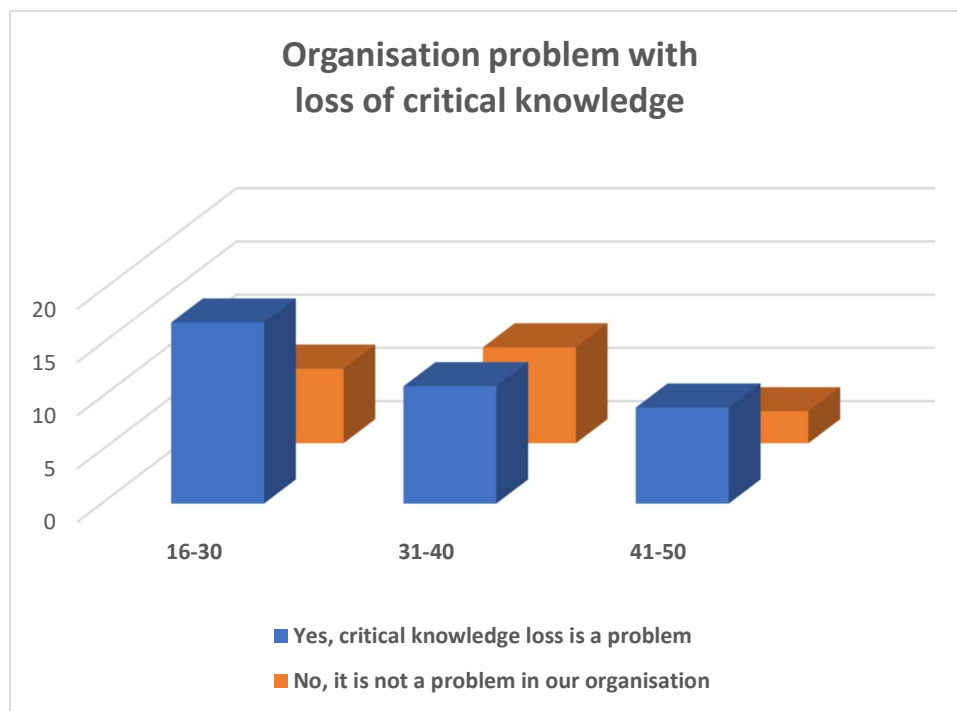


Figure 4.14 Respondents’ opinions of presence of a problem by age category

Figure 4.14 indicates that the loss of critical knowledge was seen as a problem by a majority of respondents, regardless of age category.

In the case of the 16 to 30 years age category which included 24 of the 56 respondents, a majority of the respondents considered that the loss of critical knowledge could be a problem for their organisations. The reasons were summarised as “...turnover of key personnel a problem, recently lost 3 very experienced people, no contingency plan in place, yes especially with senior management, several managers due to retire soon, experienced people not staying with company,

our organisation is not very organised, loss of critical people has weakened long term projects and yes retirement has been a loss to our company”. Summaries of those in the 16 to 30 years age category who did not consider that the loss of critical knowledge to be a problem for their organisation were:

“...our company has a defined close-out process, our office has good knowledge sharing, we have an obligatory ‘lessons learned’ process.”

Those in the 31 to 40 years age category (20 of 56 respondents), who answered ‘yes’ that they saw loss of critical knowledge as a problem were:” yes, due to bi-location of our company, yes due to retirement, HR do not facilitate job shadowing, yes due to large turnover of staff, poor communication between boardroom and staff, yes long-term staff should be encouraged to share skills and knowledge, yes consistent lack of talent, staff leaving constantly, loss of critical QS with expensive retraining and upskilling new staff.”

The replies of those who answered ‘no’ were “...Not a problem with our company, not a problem for us as we have an in-house expert on succession planning.”

Of the 12 respondents out of 56 who were in the 41 to 50 years age category, those who answered ‘yes’ thought loss of critical knowledge would be a problem because:

“... experienced design staff difficult to replace, yes senior staff replaced with cheaper options, yes as economy improves skills leave, no proper sharing of information, no succession plan due to arrogance and ignorance.”

Those who answered ‘no’ gave the following reasons: “...not experienced yet as we are a new company, our ‘lessons learned’ process is good, we have knowledge sharing capabilities.”

Question 3.5

In the next question, 3.5, participants were asked for a recent example of lost critical knowledge in their organisation.

The purpose of this question was to establish current examples of knowledge lost to organisations. Participants’ opinions on defining what critical knowledge had either left the organisation or was in danger of leaving the organisation could be collected and analysed.

The findings which are best on the contents of the 56 comment boxes that were returned are summarised by respondent age group (See Figure 4.15).

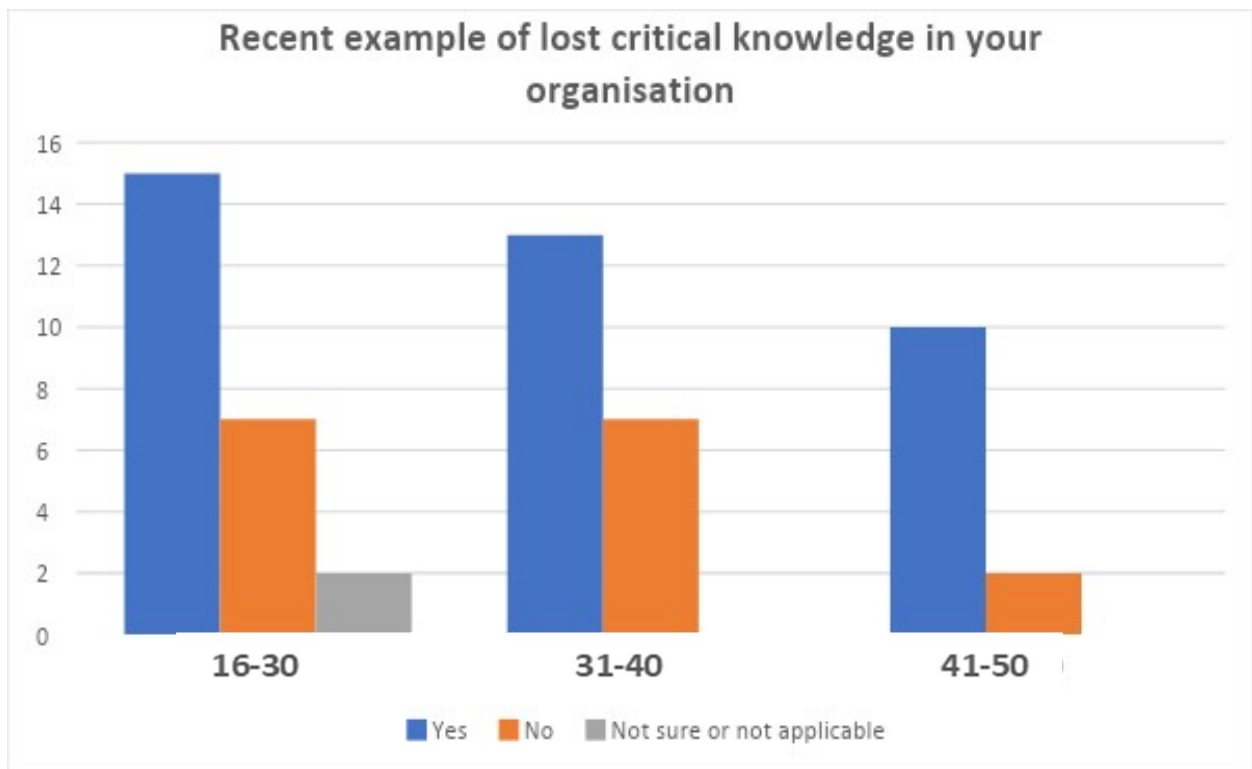


Figure 4.15 Respondents' experience of examples of lost critical knowledge by age category

Examples given by respondents in the 16 to 30 years age category (24 of 56 respondents) were:

Yes: "commercial manager left recently and not replaced, yes as company recently split we've lost critical knowledge, directors and associates left and not replaced, experienced staff become frustrated and leave, yes associate left to competitor, contracts manager with 20 years' experience was allowed leave, experienced staff moved off specialist projects, yes financial controller left, and we've lost a site manager with 'live hospital' experience."

No: "New staff continuously add to knowledge pool, nobody with critical knowledge has left our company."

Respondents in the 31 to 40 years age category (20 of 56 respondents) gave the following examples:

Yes: "Succession planning yet to be introduced, yes specialist engineer not replaced, senior staff have moved on, lost BIM specialist, compliance person left, no plan to capture knowledge, senior planner and scheduler left and not replaced, and greater number of colleagues leaving on paternity leave."

No: "No critical knowledge person has left our firm."

In the 41 to 50 years age category (12 of 56 respondents, the examples were:

Yes: “senior partner left, a great loss to our firm, specialist designer left, person with 15 years’ experience, who did not share knowledge left, yes senior staff left with no succession plan in place, three design engineers left at the same time which almost closed down that section of our practice, yes staff leaving all the time with no time allocated to absorb their knowledge, and yes staff leave don’t follow knowledge sharing protocol.”

No: “no, as this tends to happen in smaller firms.”

Question 3.6

Question 3.6 asked participants whether their organisations had exit interviews and if they did, did the organisations take them seriously.

The purpose of question 3.6 was to determine whether the organisations to which the students belonged endeavoured to capture the extent of the potential loss of organisational critical knowledge.

The findings from this question, which were taken from the comment boxes in the 56 returned questionnaires are summarised below, organised by respondent age group.

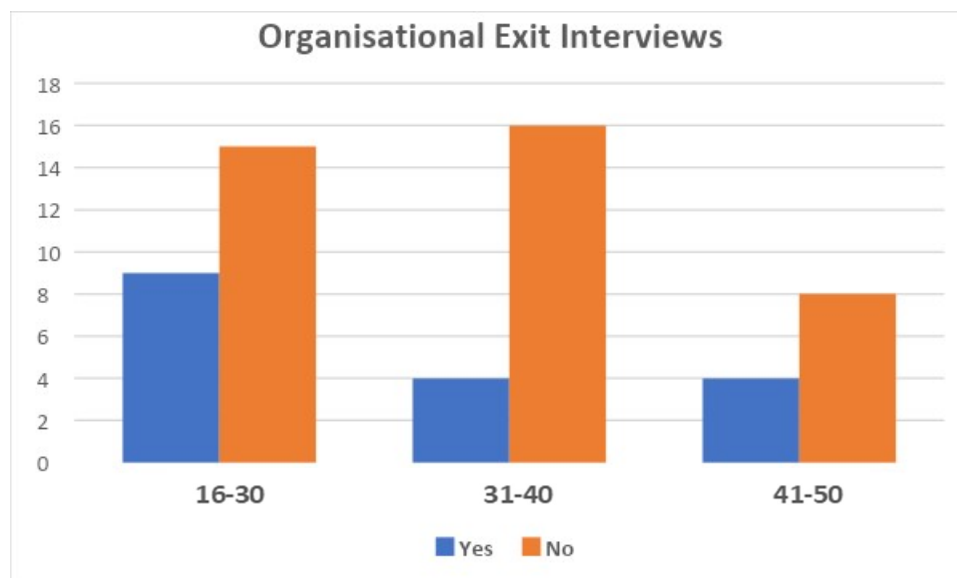


Figure 4.16 Respondents’ opinions on whether exit interviews were taken seriously by their organisation, by age category of respondent

Figure 4.16 indicates that most of the organisations did not have exit interviews.

In the 16 to 30 years age category the respondents' replies were summarised as: "yes, if required, yes, but person leaving may not always be honest, yes, we have exit interviews for feedback purposes."

No: "no, our organisation does not have exit interviews."

The responses from the 31 to 40 years age category were:

Yes: "But usually informal and lessons not taken on board and yes but how much weight put on the value of such interviews?"

No: "But I think they would be a good idea and valuable lessons learned, informal chat with a director but not a formal exit interview."

For the 41 to 50 years age category the responses were:

Yes: "Yes, not often get cancelled, or simply do not occur, yes but haven't experienced any changes made because of the process and yes but not a truthful feedback."

Question 3.7

In question 3.7, participants were asked whether the qualified and experienced staff in their organisations had handled critical events or project dilemmas adroitly and/or cleverly; and if 'yes' to please elaborate. The purpose of the question was to give the respondents the opportunity to consider how each individual organisation deals with project problems and dilemmas.

Findings from the 56 responses to this question are shown in Figure 4.17 and summarised below.

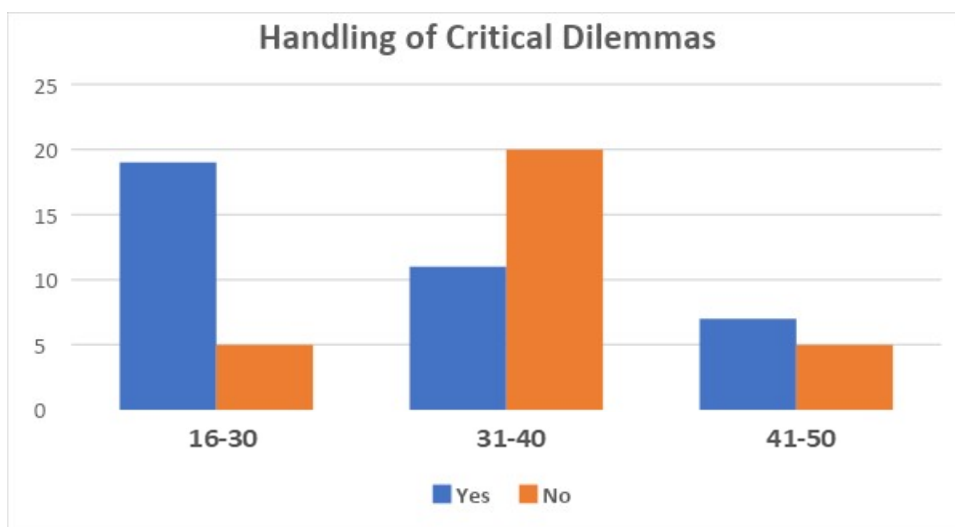


Figure 4.17 Respondents' opinions on whether critical dilemmas had been handled correctly by qualified and experienced staff in their organisations, by age category of respondent

The summarised responses from the 16 to 30 years age category were:

Yes: “working in this industry you need to learn to deal with dilemmas, yes site management usually have solutions, at such times senior managers called into help, meetings on site help focus problems, yes they use the most diplomatic way to resolve, yes we have processes in place, yes mainly regarding programme and sub contract issues, dilemmas resolved by experienced personnel, relationship with client PM critical to resolving problems, yes but process is often more stressful than it needs to be, generally problem passed up the chain to senior managers until experience can find a solution.”

No “No not always”.

The comments of the 31 to 40 years age category were:

Yes: “Usually politically driven, tend to keep dilemmas to themselves, yes, my previous company had a subject matter expert to manage dilemmas, yes we went through a very stressful conciliation this year, problems dealt with carefully and appropriately, yes good communication with all stakeholders, external consultant brought in to assist, yes our company applies operational excellence but can be penny-wise and pound-foolish.”

No “Many examples of our company mishandling dilemmas and at times dilemmas not handled professionally or well.”

The comments of the 41 to 50 years age category were:

Yes: “Yes, we are strongly influenced by corporate politics, solutions not sought internally, and dilemmas resolved at a cost, we have a good track record of handling dilemmas, staff encouraged to share and seek assistance.”

No: “Recent experience not handling dilemmas well.”

Question 3.8

In question 3.8, participants were asked whether they thought that mentoring and coaching workshops would support and offer assurances to their knowledge seekers. If they replied yes, they were asked to elaborate on this statement.

The purpose of question 3.8 was to seek the candidates’ opinions about the workshops and ultimately the mechanics of a monitored tutelage programme.

The findings, which are based on the contents of the comment boxes in the questionnaires are summarised below.

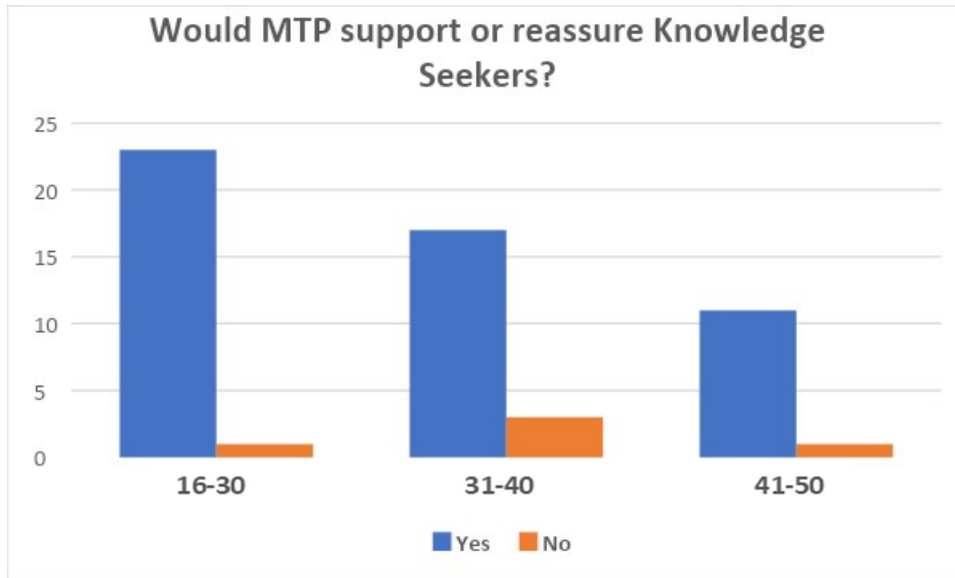


Figure 4.18 Respondent’s opinions on whether MTP would support or reassure knowledge seekers – responses by age category of respondent

Figure 4.18 indicates that the majority of the respondents, regardless of age category, thought that a monitored tutelage programme would provide support and/or reassurance for knowledge seekers in their organisations.

The responses from the 16 to 30 years age category were:

Yes: “experienced mentors would be beneficial, but mentor needs to be the correct fit, we have a defined mentor scheme but tends to be diminished recently; yes passing on knowledge prevents the wheel from being re-invented constantly; yes it would empower people and possible keep them in the organisation; yes would prefer opportunities to examine performance roles plus allow feedback knowledge shared would reduce problem issues; yes very beneficial and invaluable; yes but sometimes senior staff too busy to mentor; yes it would help people to think outside the box, it would make employees seem more valuable; yes we have mentoring schemes but too infrequent; yes but prefer in-house rather than external; yes very useful at promotion stage or when moving from one position to another and yes very useful to get perspective of other disciplines.”

No: “not applicable to my firm.”

The comments of the 31 to 40 years age category were as follows.

Yes: “mentoring is important at every stage and is critical for everyone, would be better for everyone to have a go-to person; yes but difficult to get boss to buy into it; yes of course a good idea as I have a battle to progress my career, always helpful to upskill, would encourage those with gap in knowledge to seek help; yes inhouse more valuable; yes help with communication and handling meetings; yes at start of career when applying for charter status; yes I think having a sponsor within your firm would be invaluable; yes my company involved with IEI mentoring group very helpful, mentoring would help staff progress with career, an excellent way of meeting people offsite, great help to build company knowledge base, mentoring would be a good way of trialling problems at work, and yes QS practices need hands-on expertise, otherwise it takes years to gain this confidence and knowledge.”

No “No, not sure, undecided.”

The responses from 41 to 50 years age category can be summarised as:

Yes: “off-site mentoring would greatly assist communication skills, would help staff get to know one another outside of working environment, would create better atmosphere at work; yes as industry and technology changing fast and people struggle to keep in touch with technology, interactive workshops are always a good idea but need a wider range of them; yes I’m trying to set up such a scheme for our graduates, people learn more effectively from peers, mentoring works better with smaller (focused) specific topics, while CPDs help one to one knowledge sharing is much better to get message across to graduates.”

No: “not applicable.”

Question 3.9

In question 3.9 participants were asked if they thought that personal learning goals would be supported by mentoring and/or coaching workshops? The purpose of question 3.9 was to determine if the respondents thought that their individual goals would prosper through participation in training workshops.

The findings based on extracts from the 56 returned comment boxes are summarised below.

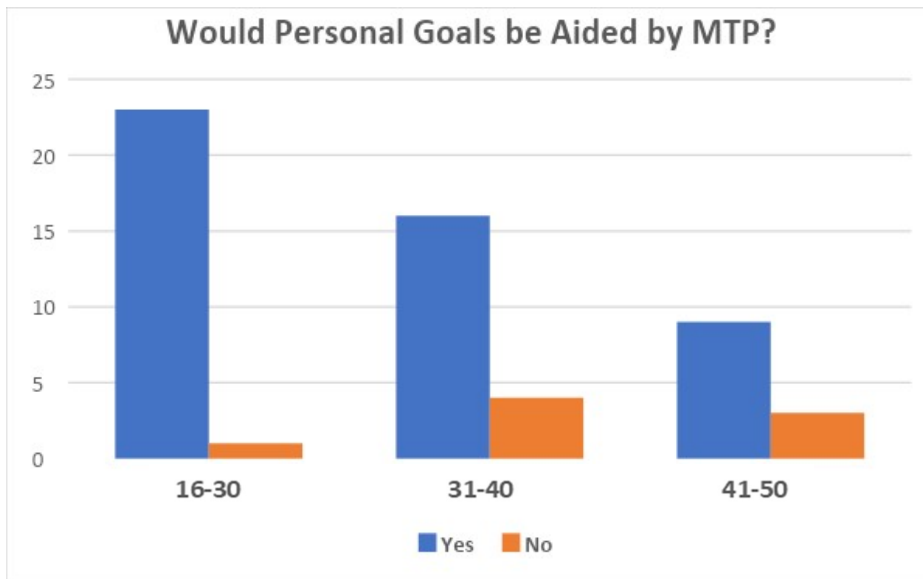


Figure 4.19 Would Personal Goals be Aided by MTP? Responses by age category

The views of the respondents in the 16 to 30 years age category were summarised as:

Yes: “yes self-development and career enhancement; yes different team members have different backgrounds and skills; yes there is an emphasis on the person to succeed when a mentor is overseeing the programme; yes as you can pursue certain items (knowledge gaps); yes supervisors will want to see employees better equipped; yes personal empowerment to the individual therefore making them more content in their job; yes but it must be linked to goals; yes would allow you learn in an area you have no previous experience of; yes as people can air their concerns and seek help with their weaknesses; yes specific help to progress your career training; yes people could get their eyes opened and minds turned on if exposure to upskilling and training; yes as we have staff reviews once per year and yes it would help people work towards goals such as charter status.”

The views of those in the 31 to 40 years age category were summarised as:

Yes: “might be very useful for verification of concepts and ideas for each individual, discussion with senior colleagues can encourage learning goal development, guidance might be available in-house, workshops very beneficial and mentor could develop individual’s learning goals; yes it is possible to learn from past experiences and problems; yes but mentor must be trained in specific area otherwise it’s a waste of time; yes mentors would help individually and collectively, as a QS practice of 18 people we have no mentoring programme.”

No: “not applicable, not sure, undecided.”

The summarised responses of those in the 41 to 50 years age category were:

Yes: “Training in our firm tends to be *ad hoc* and courses offered at times simply to retain staff, yes, our company badly needs a mentoring programme, formal training is only part of the process. Tacit knowledge comes through coaching and mentoring; yes but it must align with company strategy; yes I think a “champion of topics” could spend a certain amount of time with each employee; yes if kept to a reasonable level and set against goals; yes measurable goals are needed otherwise it’s a ship without a destination.”

No: “not applicable, not sure of the question.”

Question 3.10

In question 3.10 participants were asked whether they thought that role play applied to typical project dilemmas could be used as training simulations in their organisations.

The purpose of this question was to ascertain respondents’ opinions about problem role play and collecting their comments on any previous experience they may have had with role play in this context.

The findings, which are derived from extracts from the comment boxes of the 56 questionnaires that were returned, are set out below.

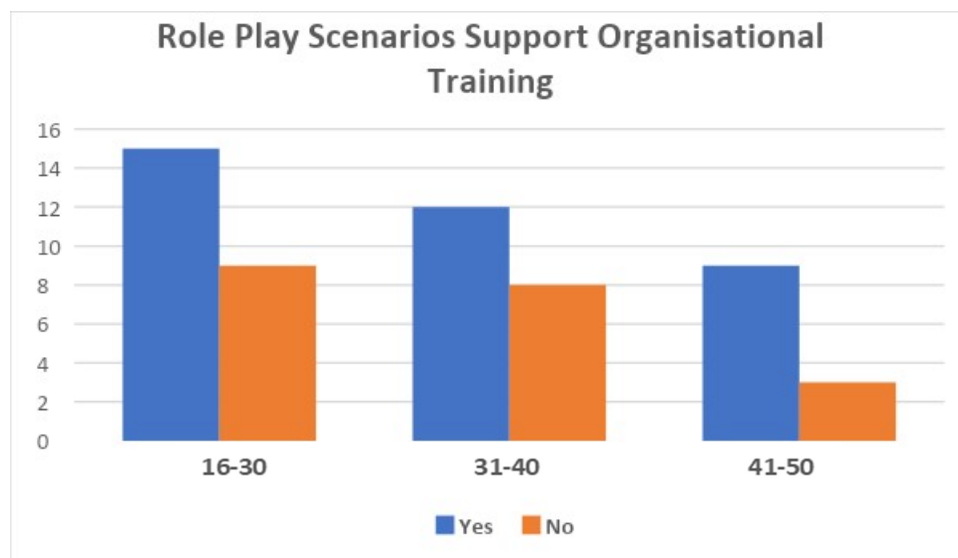


Figure 4.20 Respondents’ opinions as to whether they thought that role play scenarios would support organisational training, by age category

Figure 4.20 illustrates that a majority of the respondents thought that role play could be used in organisational training about resolving project dilemmas.

The responses of the students in the 16 to 30 years age category (24 of 56 respondents) are summarised below.

Yes: “yes could be very useful if actual dilemmas used: yes but would take up valuable time, yes learning from action better than learning from a book; yes it allows people see how things play out; yes but only with real problems to see how they were resolved; yes but as no two projects are the same but would help general overview; yes integral as part of real life solutions, would help engage with people, senior management should hold a seminar to present certain specific issues they’ve encountered and yes it would help gain work experience.”

No: “would not be effective with team who work together each day; no, as not everyone would take part, personally I think these workshops would never be the same as actual real-life problems, would meet resistance as most people set in their ways.”

The responses of those in the 31 to 40 years age category, (20 of 56 respondents), were:

Yes: any new mode of learning is worth exploring, I think it would help but not sure it would work, if problem issues were identified then this could be simulated; yes but it takes time which companies don’t always have; yes discussion prior to role play would help to highlight how to best deal with such scenarios; yes challenging or difficult situations put to staff who are managing projects to test staff reactions and how they managed the situation, hard to get managers to devote time to CPD training; yes beneficial simulating certain situations the organisation could use this process to seek out talent within the firm they may not otherwise realise also interesting see how staff behave outside office forum to see how they react and behave.”

No: “no, not really applicable, no opinion”.

The responses of those in the 41 to 50 years age category (12 of 56 respondents) were:

Yes: “yes roleplay could be a separate and external workshop, very good way to play out project problems but the goals would need to be measured to meet training gaps; yes but only in areas where there is a client interface required; yes has been done in the past with mixed results; yes project applied scenarios would be very useful to increase project competencies for less experienced staff.”

No: “not sure, no response”.

4.6 Open Forum Discussion: Phase Two Data Collection

At the concluding stage of the questionnaire session in April 2017 an open forum discussion was held by the class of project management students (See Appendix 4.4). This lasted twenty minutes and revealed some interesting aspects of managing knowledge deficits in organisations.

The open forum discussion was followed by a discussion of questions from the class of sixty postgraduate project management students. Each question was debated by several people voicing their own concerns and experiences about loss of critical knowledge and knowledge management generally in their employer organisation. The contribution from the individuals which led to active debate resulted in the eight findings below. These findings were supported by the questionnaire results. Items raised and discussed in the open forum session included the following.

4.6.1 Succession Planning

Suggestions about the lack of a structured plan to address the loss of critical knowledge from an organisation were discussed. These suggestions included identifying critical aspects of an organisation's performance that would be under threat if that knowledge was in danger of leaving the organisation. Once these areas of critical knowledge had been identified a standby person could be allocated. The standby person's role would be to assist the current possessor of such knowledge to establish a system for its retention. This would help provide sustainability of this specialist knowledge within the organisation.

4.6.2 Qualification Attainment Schemes

A company-promoted qualification attainment scheme was also discussed. The example given related to a construction contracting company with several regional offices throughout Ireland and UK. Each office had a team of accountants at various levels of professional qualification and the company promoted a training scheme with external mentors to bring all accountancy staff to the status of 'Chartered Cost Accountant'. The scheme proved to be a success. Most of the accountants encouraged each other with peer to peer training working in tandem with external mentors. This also resulted in a better working environment and was considered an excellent example of collaborative and organisational knowledge sharing with benefits for all stakeholders.

4.6.3 Perspective of the professional working on the client or contractor's behalf

Gaining a perspective of the professional working on the client's or contractor's behalf was discussed. The point at issue was how to develop an understanding the skills of the professionals working on the other side of the contractual relationship. The example given was a Quantity Surveyor who had been working for a Professional Practice Quantity Surveying (PPQS) firm for

several years following graduation. This surveyor had not experienced the roles and responsibilities of a contracting surveyor. If a career opportunity were to arise in a contracting firm the PPQS surveyor would have very little working knowledge of items such as project claims preparation or delay and disruption claims from the perspective of the contracting firm. The goal of the contracting firm is profit maximisation whereas the goal of the PPQS firm is also profit maximisation but via the mechanism of delivering a project on budget for a client. A mentoring programme for both types of Quantity Surveyors could allow more flexibility in career choice.

The class commented on how graduates could learn more if they had the confidence to continually ask questions of seniors and peers. The general consensus was that the current generation of graduates known as millennials lack the power and confidence to ask questions as a means of accelerating their knowledge acquisition. Comments and suggestions included a weekly forum or question platform which would allow less experienced employees a voice in the organisation.

4.6.4 Phase Two Findings

Statistical compilation from Data Collection (See Appendix 4.5).

The preliminary findings (direct comments from PM class) from the phase two collected data are summarised as follows:

1. If our career training and value of our tacit knowledge to our organisation is to become greater and more meaningful then we need to get greater site experience. It is difficult to gain practical experience when continually desk bound.
2. Our career options are limited if we fail to get exposure to the perspective of the 'other side'. If you are working as part of a design and management team for a number of years, then you are not exposed to the knowledge and workings of a contractual team. The goal of the contractual team on the same project is to increase and strengthen the profit margin as much as possible through contractual claims and variation procurement. Understanding the 'other side's knowledge and exposure may allow career option change and opportunities.
3. Greater communication skills for chairing meetings, dealing with commercial transactions or negotiating with subcontractors and suppliers.
4. Learn from other professions and how organisations could benefit from mentoring and coaching facilities as used in legal, medical, aviation, accountancy and finance professions.
5. With little or no succession planning in an organisation how can a professional become a 'key person' or be in a 'subject matter expert' position with critical knowledge.

6. With current shortage of professional skills evident in the construction industry nationwide how can organisations ensure sustainability of knowledge retention in the firm.
7. Implementation of qualification attainment scheme.
8. Confidence to ask relevant questions of peers and senior management.

4.6.5 Structuring the findings into a mentoring workshop framework.

After considering these eight critical findings the researcher then grouped them into a workshop framework to address the training gaps. Points 3 and 8 were grouped into the first workshop. Points 1 and 2 were grouped into the second workshop. Points 5, 6 and 7 were included in the third workshop and point 4 was covered in the fourth workshop.

The subject matter of each of the four workshops is shown in Box 4.2.

Box 4.2 Subject matter of each of the four mentoring workshops.

Workshop One

Communication skills improvement and training.

Asking relevant questions to accelerate knowledge transfer.

Workshop Two

Exposure and experience of how the “other side” of the team operates. Construction Quantity Surveyors anxious to understand how the professional team Quantity Surveyor carry out their duties. Further insight could be of benefit to both sides of the construction team. This would also support career changing options if the need arises in the future.

Greater site experience to support technical knowledge and training.

Workshop Three

Creating a sustainable knowledge retention programme.

Implementation of a qualification attainment scheme for all Quantity Surveyors in an organisation.

Organisation’s implementation of efficient succession planning.

Workshop Four

Examining other professions and how they maximize mentoring and coaching programmes for the betterment of employee and organisational tacit knowledge.

4.7 Develop, Test and Validate Findings

Using the iterative cycles of Action Research, this MTP process can move from *knowledge evolution* to *knowledge acquisition* as required both by the individual and the organisation. Any of the eight items listed can be replaced or prioritised by the individual or organisation to the benefit of both. The format and goals of the workshop will be analysed further in the next chapter.

4.7.1 Format of the MTP Workshop

Having considered the training gaps revealed by the answers to the questionnaire and subsequently confirmed and supported by the open forum discussion, the initial framework of an MTP progressed in the following stages:

- Stage 1 The tacit knowledge and critical knowledge gaps in the training of workshop participants were defined in conjunction with human resources specialists (HR), direct supervisors and groups of individual participants.
- Stage 2 This consisted of mentoring sessions with groups of 4 to 5 participants. Experts were accessed to assist and support the workshops. At this stage the frequency and number of sessions was not finalised or agreed. It was deferred until after the next phase of discussions with candidates and management. The frequency and number were eventually fixed as four workshop mentoring sessions and four breakout sessions.
- Stage 3 This consisted of groups of four or five participants who met after every alternate session for peer to peer discussion, in breakout forums to support each other's training in feedback sessions.
- Stage 4 This stage used the Action Research model of iterative and cyclical learning. The participants were interviewed with HR and the researcher present on completion of each workshop. They discussed the extent of their knowledge enhancement after participation in the workshop. The participants were then allowed the opportunity to continue the discussion iteratively until each participant was satisfied that participation in the discussion had led to the achievement their training goal.

4.7.2 Goals for MTP workshops 1 to 4

Before assessing the workshop goals, the following points required further consideration:

- Ascertaining gaps in individual and peer group knowledge
- Facilitating a knowledge transfer solution in conjunction with HR department and in agreement with participant
- Facilitating potential solutions and support for organisational succession planning

- Importing expertise in agreement with all parties
- Facilitating peer to peer mentoring sessions
- Monitoring programme activities
- Observing and recording progress
- Exit interviews with participants
- Confidential report for HR on completion

After considering these points, the researcher grouped these considerations into four mentoring workshop goals. Once the framework for the four workshops had been designed in agreement with all the stakeholders, the researcher set about the selection of mentors for each workshop. This selection process included a round table discussion with the five participants and the host organisation's HR Manager. This process allowed the researcher to confirm there was no conflict of interest with mentor choice and that the participants were both aware of the identity and credibility of each mentor.

The goals of each MTP workshop are set out in Figure 4.21.

<p>MTP Workshop 1</p> <ul style="list-style-type: none"> • To improve communication skills and to encourage candidates to have the confidence to question peers and management. As a support tool for knowledge transfer <ul style="list-style-type: none"> ○ How to build a positive client relationship ○ What is real wealth? ○ Recognising personality types and how to deal with them ○ How to manage and monitor a professional relationship ○ To consider and recognise yourself as an individual brand of your organisation ○ Candidates encouraged to question and debate aspects of presentation ○ Explain function of forthcoming break-out session 	<p>MTP Workshop 2</p> <ul style="list-style-type: none"> • To gain an understanding as a PQS how a construction company quantity surveyor has to deal with projects, protocol and challenges • Site based Quantity Surveyor's roles and functions <ul style="list-style-type: none"> ○ Taking over project from the estimators file onward ○ Measurement and checking ○ Records on site ○ Tracking change ○ Familiarisation with contracts and conditions ○ Supply chain management ○ Day to day operations for a site-based quantity surveyor
<p>MTP Workshop 3</p> <ul style="list-style-type: none"> • Professional qualification enhancement • Internal organisation support for further education <ul style="list-style-type: none"> ○ Implementation of an internal qualification support scheme ○ SCSi interaction with APC candidates ○ SCSi presentation of how to achieve APC and debate various pitfalls in preparation for APC ○ Debate the APC process ○ Open discussion on fears and tribulations in preparation for professional qualification ○ Organisation's encouragement and support 	<p>MTP Workshop 4</p> <ul style="list-style-type: none"> • How other professionals deal with knowledge transfer through their professional bodies and through their organisation • How they mentor professionals <ul style="list-style-type: none"> ○ To gain an understanding of effective mentoring ○ Effective Mentors ○ Knowledge transfer for construction and engineers (IEI) ○ Debate how lessons could be learned by quantity surveyors from engineers knowledge transfer techniques

Figure 4.21 Goals of each MTP workshop

4.7.3 Compilation of Suggested Monitored Tutelage Programme

After the workshops had been completed, the next stage in the Action Research process was to compile a 'suggested monitored tutelage programme (MTP)'. The following four stages are required.

Stage 1: Completion and reporting on defined knowledge transfer tasks.

- Stage 2: Facilitating exit interviews with each participant and providing support for future contact and communication.
- Stage 3: Close-out of MTP with participants, supervisors and HR departments.
- Stage 4: Thank all the participants for their involvement and co-operation.

Chapter 5 will discuss the above formats and goals of a bespoke monitored tutelage programme. The data collected will be used to establish the mentoring and coaching programme to encourage the transfer of critical and tacit knowledge for both the individual and the organisation in a workable and sustainable manner.

4.8 Testing and Verification of Data with MTP Workshops 1 to 4

The format of establishing the workshops is set out below.

Once they had been selected and had agreed to participate and present at the workshop, the mentor or coach made a draft presentation to both the researcher and the organisation's HR Manager. The purpose of this exercise was to ensure the content was related to the participant's expectations. The purpose of this exercise was not to exert undue influence on the mentor or coach about the content of their presentation but to ensure that the presentation was focused on dealing with the confirmed gaps in knowledge and training.

4.8.1 MTP Workshop One

Two mentors were sourced by the researcher to address the criteria and gaps in knowledge discussed earlier. Their experience and skills related to PR media communications and the tacit knowledge elements that exist in communicating with the media. The other mentor-coach focused on the communication skills relating to construction management personnel and how to read personality types. Each participant would have to identify their own personality type from the discussed profiles and discover how to read the personality types of third parties they come in contact within their work environment. The participants would also have to identify why this ability is a strength and confidence builder for professionals.

Both mentors were mature, experienced professionals with a proven track record of dealing with very large projects both in Ireland and internationally. On conclusion of the 90-minute presentation the group including presenters, HR Manager and researcher adjourned for a working lunch to another meeting room to allow the participants engage in a question-and-answer forum.

4.8.2 Presentation One (MTP Workshop One)

The workshop commenced with the researcher presenting to the five participants, HR Manager and the two invited speakers and how their presentations would set out to achieve the goal as previously discussed. (See Appendix 4.6 for researcher's presentation).

Presentation one on personality types focused on building positive client relationships and the tacit knowledge and emotional intelligence skills required to communicate. Participants were requested to sit in silence for a moment, agreeing to open their minds to questioning new concepts and ideas, how these skills could be applied to their career, personal life and current employment role.

Participants were asked "At this point in your life how wealthy are you, *i.e.*, what represents your true net worth?" Net worth means savings, positive equity from your home, resale value of your car and specialist items such as artwork or record collections. Each participant commented on their personal wealth.

Then the speaker queried "what is your true wealth?" Meaning what is the value of the participant's health, relationships, children, family and friends? Participants were asked to consider this wealth as their lifetime's legacy.

Then participants were asked "how intelligent are you? Consider your primary, secondary and third level education achievements. Do you know your own IQ?". They were further asked to consider the statement, "your emotional intelligence is of greater importance than academic wealth". The speaker then explained the responsibility and onus on the QS professional when meeting clients, contractors, sub-contractors and suppliers. Participants were asked "how do you build a positive relationship with these parties?" They were asked to "consider why people would wish to do business with you?" It was explained that, in general, people prefer to deal with someone they can like, trust and respect. The speaker explained the MBTI personality test (See Chapter 2, Section 2.5.5.4) and how useful it may prove as a support tool to Tacit Knowledge.

The speaker went on to explain that each participant should be capable of recognising which category they associate themselves with plus how to categorise the people they deal with. He also explained that we more than likely are an amalgam or mixture of each category, but the portions of each type are what gives us our individual personality. It was explained that these categories are only indicators but are helpful in defining both ourselves and the people we are dealing with in the workplace.

4.8.3 Building Positive Relationships

Having used tacit knowledge and emotional intelligence to decipher which personality type one is dealing with, the next step is to consider how to build a positive relationship with the client, contractor, supplier or other contact. The speaker focused on the professional and client relationship. It was emphasised that communication with your client is the conduit to building your relationship. Research has shown that primarily there are four different ways of communication transfer with a client:

1. Body language and non-verbal communication, representing 50% of occurrences.
2. Spoken word, representing 20% of occurrences.
3. Written word, representing 15% of occurrences.
4. Social media, representing 15% of occurrences.

As mentioned in the literature synthesis in Chapter 2, generational types differ in chosen methods of communications. Generation Y (born between 1965 and 1974) appear to prefer social media as a chosen communication mode, but it has been the researcher's experience that success at building a positive relationship with a client relies heavily on the other three components: body language, spoken word and written word.

The speaker analysed each type of communication and indicated that in relation to body language and non-verbal communication, dress and appearance should be appropriate to the occasion, posture should be alert but relaxed, movement and proximity should match body and words and finally one must be very careful with gestures as they may be misunderstood due to cultural differences. Participants were told that it is generally considered good communication to retain eye contact during discussion. This enables a rapport and people generally feel they are being taken seriously when somebody engages with them and holds eye contact attentively; people tend to trust a person if they make eye contact. Facially, responses should be engaging, showing facial expressions and be clear with delivery of speech, not mumbling and speaking purposefully. The speaker emphasised that tone and volume of voice are an important part of non-verbal communication. He said it was important to avoid aggression, bad language and sarcasm. Staying focused on the points discussed and concentrating on the precision of facts and end goal of meeting are key. Further advice on building client relationships included getting to know the client and their interests such as sports, family and career.

Points such as staying in contact with your client in a relaxed manner; being seen to be personable and polite in their company; never to embarrassing them, especially in company; being human in their company as no one can be perfect were all suggested as important. The speaker said that it was sometimes good to show weakness and vulnerability. The final point was that it was good to strive to enjoy the company of clients as lastly strive to enjoy their company as much as they enjoy yours.

It was emphasised that asking questions to gain knowledge and information is paramount to successful communication outcomes. In order to ask relevant questions, active listening must be exercised. To be a good listener requires being open minded, not interrupting, asking questions to clarify, paying attention to what is not said out loud, avoiding assumptions and seeking first to understand.

Other advice included building the trust relationship initially via:

- A third-party reference from a party that the client would trust.
- Behaving properly and professionally during the relationship.
- Always thanking people as it will be noted by all parties.
- Never speaking ill of people to the client as they will wonder if they are to be next for comment.
- If you are wrong, admitting it and moving on.
- Never holding a grudge in a relationship.
- Displaying loyalty to the client.

4.8.4 Managing and Monitoring a Professional Relationship

People the client will respect are the people who deliver. The participant must be seen to be a person of their word so delivery of what is promised is vital. They are also due respect so they should not belittle themselves for the sake of the relationship. Finally, in Table 4.3, the speaker presented an action and comment summary of how to manage and monitor a working relationship.

This concluded the first workshop presentation and the speaker requested questions be left until the second speaker had finished his talk. Participants were encouraged to note questions either for later at the open discussion or to await the informal break-out session the following week.

ACTION	MENTORING COMMENT
Develop soft skills	It's not always about engineering or finance.
Manage expectations	Be realistic of what you expect from building and maintaining this relationship
Meet in neutral venues	Try to remain professional about where you meet to support impartiality
Emotional intelligence is required	Work on maturity and respect relationship
Be a team player	Endeavour not to work as an individual within a team. Show solidarity with team.
Make people's lives easier	Try not to be an obstructionist.
Be a problem solver rather than a problem maker	Dealing positively with problems will build a sustainable mature relationship.
Flattery is always acceptable.	A measured degree of flattery is appreciated.
Finally, it's about your client's needs not your wants.	Focus on returning to the client's needs before and after every meeting.

Table 4.3 Managing and Monitoring Relationships indicating comments on actions and mentoring

4.8.5 Presentation Two (MTP Workshop One)

The second speaker focused on the individual's confidence both to communicate effectively and to procure knowledge through structured questioning. He explained that each *individual* is a brand and it was not appropriate to only consider the organisation as a brand. The speaker stressed that each person had their own individual brand. Participants were asked to consider how they could identify their individual brand and what is different about each participant and what they brought to the organisation. This opened out into a discussion about how, with the organisation's help, their own brand and the employer's brand could flourish in tandem.

Examples were put forward to assist the participants share tacit knowledge. One such suggestion was a blog or knowledge platform. The younger, less experienced, participants thought this would be an efficient way to receive pertinent knowledge effectively, but the other participants disagreed arguing that they already received a large amount of emails each day. They thought that this blog

would be just another distraction and a hindrance to the completion of their tasks. One participant commented that he was continually 200 emails in arrears, so committing to answering a blog was just not possible.

The subject of knowledge prioritisation was introduced. Participants were asked to give examples of both prioritized and non-prioritised knowledge. The speaker explained that it is common in professional services companies that only a small percentage of people will possess critical knowledge. This is their specialty and what makes them stand out to management and may come at a premium. To acquire this critical knowledge may not be easy and the transfer of knowledge may require coercion and management pressure. Management would usually have identified this knowledge as critical and prioritizing critical knowledge involves the possessor of the knowledge, the enthusiastic recipient and management. The speaker concluded by saying that “critical positions are categorised by a position risk factor” and that “it is important not to confuse critical knowledge with high performance”. After an open discussion at the closing stages of presentation one, one of the participants asked for examples of how critical tacit knowledge may be identified, captured and transferred.

In response to this question the following examples of knowledge transfer techniques were put forward and explained.

The examples are shown in Box 4.3.

Box 4.3 Examples of knowledge transfer techniques explained by the second speaker in Workshop One

- Interviews. These may be structured, semi-structured or unstructured.
- Process or concept mapping. These may be model and/or link a concept process.
- Observation. These may be watch and learn sessions.
- Constrained tasks. These may be a series of Yes/No answers.
- Expert Commentary. This is where the expert would have a running commentary while performing an action or process.

As was set out in the agreed MTP programme one week after the workshop, the researcher and participants only would meet for a break-out session in a more relaxed informal environment. No company management or HR personnel were in attendance for these sessions. In advance of the session the participants had the mentor’s presentation and a summary note from the researcher on

reflective practice as a prompt for summarising the session. They were asked to meet and discuss MTP one and later forward their points and opinions directly to the researcher.

This followed the format of the author's presentation (See Appendix 4.7).

4.9 Workshop One feedback

In summary, the five participants and both workshop presenters reacted and reflected positively to the first workshop. The presenters reported that they found the five participants intelligent, engaging and eager to learn. The feedback session allowed the participants the opportunity to recount and convey how they considered the workshop had concluded. Mostly positive reactions ensued with comments such as the importance of loyalty, trust and respect for all parties in the workplace, the ability to read different personality types and traits and valuable advice on exercising good communication skills to build positive relationships. Negative comments included the request for a final wrap up round table discussion, which did not happen with the presenters and one to one session with each presenter. Both negative comments can be addressed by the reiterative aspect of the MTP workshop cycle. Time restrictions for both presenters did not allow an extended workshop. The creation of a blog was discussed as a method of tacit knowledge transfer but was mostly rejected on the basis that pressure and deadline commitment in the workplace is not conducive to participating and responding to blog notices and requests. To varying degrees the participants found the workshop useful and engaging and all agreed a regular MTP for related topics would be very helpful in their busy lives.

4.10 MTP Workshop Two

The second workshop set out to address the following two knowledge gaps discussed earlier in this chapter.

The first knowledge gap was exposure and experience of how the other side of the contractual relationship operates. Construction Quantity Surveyors may be anxious to understand how the professional team QS carry out their duties and *vice versa*. Further insight could be of benefit to both sides of the construction team. This would also support future options for career change options if they arose in the future.

The second knowledge gap related to having more on-site experience to support technical knowledge and training.

The mentor for workshop two was a commercial director with a large construction and civil engineering firm. It was agreed that he would mentor and deal with both the above topics. He

started the workshop by explaining his own background. He commenced work as a graduate surveyor with a PQS firm for his initial training before joining a construction firm as Quantity Surveyor. He is currently the firm's commercial director responsible for €200 million worth of projects.

In advance of the workshop the researcher had met with the mentor to outline the function and focus of the workshop. The mentor highlighted from an early stage the difference between the roles of a contractor's site-based Quantity Surveyor compared to a contractor's office-based Quantity Surveyor. The participants received this agenda from the researcher prior to the workshop. This was the basis of discussion at the pre-workshop meeting with the mentor and researcher. In order to address both workshop goals, the presenter focused on all roles and responsibilities of a contractor QS but also explained the site experience required for a site-based QS.

The roles and responsibilities for both a contractor's office-based and site-based Quantity Surveyor as set out in the presentation by the mentor are summarised in Box 4.4.

Box 4.4 Roles and responsibilities of a QS

Roles and responsibilities of an office-based contractor's QS:

- Estimator's handover file – Risk Register: highlighting areas of risk associated with the successful and accepted tender
- Form of Contract – key clauses, time bar, clause exclusions or deletions
- Check Tender drawings against register of drawings received
- Comparison check between construction and tender documentation
- BOQ Measurement – are quantities correct? Is contract with or without quantities?
- Check construction drawings with site foreman. Knowledge of building technology
- Cross reference architectural and engineering drawings (with site project team)
- Planning permission conditions – knowledge of conditions and possible restrictions
- Guaranteed Maximum Price – how to assess risk for such inclusion
- Submittals and Value Engineering – QS Role

Roles and responsibilities of a site-based contractor's QS:

- Greater control of plant and labour. Ability and confidence to question site management when plant becomes idle on site. Understanding sub-contractor attendances and knowing what attendances are provided for and are not provided for in the tender and contract.
- Dayworks (time and material claims) a daily thorn in the side of both CQS and PQS. Dayworks should be dealt with on a daily basis on site rather than when they appear in a monthly valuation at the end of each month.
- Photographic documentation. The majority of mobile phones today have excellent quality camera facilities so daily photographic back-up can be recorded as proof of extras or work carried out.
- Site measures. Assessing interim valuations allows the site-based QS to become familiar with the project through measurement on a regular basis.
- Closer communication with subcontractors. QS must be careful with the development of a daily working relationship with sub-contractors on site as familiarity may breed contempt.

Continued over

Box 4.4 Roles and responsibilities of QS (continued)

- Greater knowledge of building technology – how is it built, how long does it take to install components and fixings.
 - Greater knowledge of construction programmes – realistic outputs versus over optimism
 - Resource tracker allocations - planned versus actual.
- Site based QS may not be an ideal candidate to become an estimator as they experience all the components and delays which may detract from commerciality to win a tender.

Once the presenter had explained and summarised both roles for a contractor Quantity Surveyor then the detail of the presentation followed. This represented the mentor's working experience and tacit knowledge of a contractor's QS.

The mentor then presented the details of his view of the roles and responsibilities of a Quantity Surveyor based in contractor's office, which were:

1. Estimator's Handover File (See section 4.10.1 below).
2. QS Initial Task (See section 4.10.2 below).
3. Supply Chain Management (See section 4.10.3 below)
4. Understanding the Brief and the QS Initial Task (See section 4.10.4 below)
5. Risk Register (See section 4.10.5 below).
6. Cost Management System (See section 4.10.6 below).
7. Day to Day Operations (See section 4.10.7 below).

The mentor outlined what he saw as the roles and responsibilities of a QS based on site.

1. Records, Records, Records (See section 4.11.1 below).
2. Building Technology (See section 4.11.2 below).
3. Daily Communication with Project Team and Subcontractors (See section 4.11.3 below).

When this definitional part of the presentation was concluded, the mentor moved on to give detailed accounts of the individual items listed in his presentation of the roles and responsibilities of a surveyor based in a contractor's office. Sections 4.10.1. to 4.10.7 gives the details of these items.

4.10.1 Estimator's Handover File

The mentor set out the details of the estimator's handover file. He also indicated what should be included in this handover process to the contractor's QS.

The items he spoke about are listed below.

1. Overall value and programme (establish macro outputs).
2. Type of construction (Commercial, retail, *etc.*).
3. General areas – GIFA, external and internal walls, siteworks, *etc.*
4. Key elements (preliminaries, substructure, frame, roof/full fit-out, siteworks, *etc.*).
5. Identified long-leads *e.g.*, curtain walling, MEP, fittings, *etc.*
6. Generous Measures. Have any been identified? If so, how was it dealt with?
7. Profit margin. Where is it?
8. Late quotes, estimator's 'flyers' identified and discussed.
9. Tendering timeframe in weeks or days.

4.10.2 Initial Understanding and Familiarisation

Under the heading of 'Initial Understanding and Familiarisation' the mentor spoke about the forms of contract that needed to be understood and which the contractor's QS needed to be familiar. The topics that he covered are set out in Box 4.5.

Box 4.5 The forms of contract that need to be understood by Quantity Surveyors working for contractors.

- Types of contract, *i.e.*, RIAI, PWC, FIDIC, NEC – amended versions.
- Who has formulated contract – PQS or Legal advisors?
- Previous experiences of working with PQS firm.
- Key clauses and check for exclusions or amendments.
- Potential of problems with supply chain.
- Payment terms and effect on cash flow.
- Subcontractors – Client and Design Team preferences (Available Discounts?).
- Declared Risk Register (as opposed to unknowns).

4.10.3 Supply Chain Management

In relation to supply chain management, the mentor explained the procedures involved in supply chain management that the Quantity Surveyors working for a contractor needed to be aware of. It was explained that the contractor's QS also needed to be aware of the implications of the procedures involved in supply chain management. The topics included in the presentation are set out in Box 4.6.

Box 4.6 Supply chain management; procedures and implications.

- Client Preferential sub-contractors and suppliers.
- Design Team Preferences.
- Terms and Conditions (of Client and Design Team Enquiry – same as GC?).
- Discounts – potential further discounts to be investigated.
- Long lead-ins to be reconciled with supply programme.

4.10.4 Understanding the Brief and QS Initial Tasks

In this part of his presentation the mentor put great emphasis on properly understanding the brief before investigating the minutiae.

The subjects covered are shown in Box 4.7.

Box 4.7 Subjects covered in talk on 'understanding the brief and the initial tasks of the QS'

- Review of estimator handover meeting.
- Timeframe to commence on site.
- Procurement Schedule – Urgency of immediate start and/or appointments.
- Overall programme review.
- Review and analysis of architectural and engineering drawings.
- Macro measures – sense check and cross check.
- Discrepancies – what are the options available if discrepancies exist.
- Buildability – in conjunction with GC Project Team.

4.10.5 Establishment of the Risk Register

The next topic covered in workshop 2 of the MTP process was the establishment of the Risk Register.

The mentor analysed each of the points contained in Box 4.7 and indicated how these risks could be identified. He said that the contractor's QS needed to be able to identify each of them. Risks highlighted by the estimator and the measures required to address them. These risks are set out in Box 4.8.

Box 4.8 Risks that need to be addressed when establishing the risk register

- Post-tender risks (measures or rates).
- Value Engineering proposals – submittal methodology.
- Preliminaries and site overhead costs.
- Programme – Notify design team and client of timescales (irrespective of identified RFP Process).
- Interfaces – identified/measured.
- Sub-contractors – Client and Design Team preferences (Further discounts available?).
- Declared Risk Register (as opposed to unknown risks).

4.10.6 Operating a Cost Management System

Operating a cost management system was the topic of the next part of this session. The mentor explained each of the points set out in Box 4.9.

Box 4.9 Subjects covered in 'operating a cost management system'

Contract System – Understanding Requirements: examples include:

- Cost Plus Contract.
- Guaranteed Maximum Price.
- Earned Value Management Contract.
- Target Cost Contract.

Operation of System. Contractors QS may be required on a regular basis to supply the following:

- Cost Report “Snap-Shot”.
- Cost Value Forecasting.
- Cost Value Reconciliation.

4.10.7 Day to Day Operations for Office-based QS

In this part of his presentation about the work of a contractor's QS the mentor analysed the day-to-day operations of the office-based contractor's QS. Topics covered, based on the mentor's PowerPoint presentation are shown in Box 4.10.

Box 4.10 Topics covered in mentor's presentation on day-to-day operations for office-based contractor's QS

(a) The QS will be required, usually on a monthly basis to submit valuation at month end in accordance with contract terms and conditions

- Procure site report and review progress.
- Review subcontractor claims and assess validity.
- Determine what materials are on site and ownership of same.
- Issue relevant back-up material with valuation if required.
- Claim on Variations of carried out. Full detailed analysis to be included in monthly valuation/application for payment.

(b) Meeting Attendance

- Site Meetings – Design team and client attendance.
- Internal Meetings – Review of safety, subcontractors, progress *etc.* separate commercial meeting after with CM and PM to review cost report.
- Subcontractor progress reviews.

(c) Communications/interactions with PQS and subcontractors

- Establish protocols on communications and reporting (no surprises!).
- Variations – fairness approach, offsets, *etc.*
- Build rapport with counterparts.
- Advise on both pros and cons that are being faced by GC.
- Reality check for both parties (PQS/GC/Sub-contractor).

4.11 Day to Day Operations for a Site-Based QS

The site-based QS is the contractor's cost manager at the coalface of the project dealing with all cost-related matters on site. The presenter emphasised the importance of records on site while using technology such as saving photographic images on a daily basis, understanding of construction technology and developing communication and presentation skills as a team-player on site.

4.11.1 Records, records, records

The outline of his presentation on records is shown in Box 4.11.

Box 4.11 Outline of mentor's presentation about the importance of records for a contractor's QS who is operating 'on site'

- Site Diary – QS should cross reference with site daily allocations sheets.
- Photographs – essential to record on daily basis and provided backup from single device.
- Measurements – Walk site daily. Check work in progress and completed works.
- Personnel – GO's and craftsmen on dayworks (authority to sign off?). Direct or agency?
- Plant and equipment – Daily check. Are they being used – if not, off-hire?
- Requisitions – Review all material requisitions and establish if it should be part of sub-contractor's brief. Site personnel will often take easy option.

4.11.2 Building Technology

The second part of the presentation about the work of a site-based contractor's QS dealt with the importance of building technology. The mentor emphasised that it was important for the QS to “get into the weeds” as, very often, “the devil is in the detail”.

The outline of the topics covered in this part of the mentor's presentation is given in Box 4.12.

Box 4.12 Building technology and the contractor's site-based QS

- Subcontractor interfaces – who is responsible for each section?
- Design development – is it included in subcontractor quote? How complex and how much is involved? How was it priced?
- How will KPI's be assessed against each work element?
- Exposure to how it is built – experience that you may never get in an office.
- Outputs: How long do tasks take? What was the programme allowance? How do you mitigate without effecting margin?
- How much will submittals cost? Has QS captured all options before submission?

4.11.3 Daily Communication with Project Team and the Importance of Personality

In the last of his presentations in workshop two, the mentor spoke about how understanding some aspects of psychology and the company culture can be a challenge for graduate Quantity Surveyors. The mentor's advice to the members of the group is summarised by the headings and notes in Box 4.13, which is taken from his PowerPoint slides.

Box 4.13 The importance of understanding personalities, company culture and communications

- Personalities – can be psychological warfare. Strong personalities but poor operators. What options are available? Look inwards – what are you like?
- Company culture – Internal and Supply Chain. What are reporting procedures. Do you report a hit on the profit margin? Do you penalise the sub-contractor? Do you work through issues?
- Company culture – External, Design team and Client. What reporting procedures are being asked for. Do you issue EOT's and RFI's on day one and start building a claim. Do you work through issues?
- Emails or face-to-face/phone calls – what is the preference? Is your personality based on avoiding confrontation or do you relish the argument?
- Communications with your own team can be as fraught as with the Design Team and Client
- Thus, QS's job is not an easy job – it is tough!

4.11.4 Summary of Workshop Two

All participants reacted well to workshop two. The only (slight) exception was that one participant had previously worked as a QS for a contractor and had some experience of the issues raised. However, he did state several times that working for a contractor requires a very different mindset to that of a QS in a practice. This same participant said that the skills required needed to be practiced and exercised, otherwise the QS would become stale and inexperienced in how to address some of the situations that occurred in this branch of the QS profession. Positive comments about the presentation included the point that participants now had a better understanding of how the contractor's QS must protect the builder's margin. This was a different focus to that of the client's QS who is focused on protecting the budget and keeping a strict cost control of the project. Items such as lead-in times and value engineering seemed to get all participants energised for further discussion. Building relationships between the contractor and the client QS was discussed in detail at the conclusion of the workshop. The view of the five client Quantity Surveyors present was that the contractor is less inclined to create a cordial working relationship during the project. Their opinion was that the contractor QS is focused on change orders and formulating delay and disruption claims. They also expressed the opinion that the contractor's QS is less concerned with building relationships for further projects with the same management team in the future.

Conclusion drawn from the second workshop: This second workshop showed that there was a great appetite for discussion of the various issues raised. All the participants said that they thought that they could benefit from further iterative workshops with contractors, sub-contractors and possibly specialist suppliers. The feedback session was much more energized and inclusive than the one for the first workshop. All reported that they enjoyed and benefitted from the workshop.

4.12 MTP Workshop Three

Workshop three was the penultimate workshop. To allow the group an opportunity to air their opinions about the progress of the workshops. The initial group of five participants increased to eleven when the organisation publicised the purpose of the SCSI visit on its internet. The majority of the extra participants were preparing for APC.

The workshop set out to address the knowledge transfer gaps identified for MTP 3. These gaps were (i) creating a sustainable knowledge retention programme and (ii) implementation of a qualification attainment scheme for all Quantity Surveyors in an organisation. Both are summarised below.

1. Creating a Sustainable Knowledge Retention Programme

Examples of retaining specialist or critical knowledge could be a practice or firm dealing with areas of specialist construction that do not transfer easily to less experienced firms. They may include markets such as specialist fit-out contractors, data storage building, civil engineering firms specializing in water works, bridges and dams. All this specialist knowledge must be retained by the firms or practices if they are to remain operable and competitive. Smaller and medium sized firms may focus on smaller or medium sized practices, they may focus on serial market areas, (*i.e.*, where similar contracts are repeated), such as residential building or commercial developments. Organisations and HR departments could be encouraged to form a knowledge retention programme when an MTP highlights the firm's vulnerability to the risks arising from knowledge loss.

2. Implementation of a Qualification Attainment Scheme for All Quantity Surveyors in an Organisation

In cooperation with the professional institutes and societies, a programme could be established to strengthen and bolster the in-house knowledge of quantity surveying practices and firms. This would have the ability to raise the entire level of qualification for the practice or firm. The professional institutes have a vested interest in assisting and supporting this process and may become intrinsic to the MTP. Professional practices and construction firms may incentivise a firm's participation in such a programme by providing financial support as the various levels of qualifications are attained.

MTP 3 was co-presented by the SCSI Education Director and the chartered quantity surveying organisation's HR Manager. In advance of the workshop the researcher met with both presenters to agree a strategy to cover both aspects of the two knowledge gaps addressed in MTP 3.

The potential focus for MTP 3 and solution to the problem of 'creating a sustainable knowledge retention programme' was tacit knowledge sharing within the organisation. Identifying personnel with 'key person' skills and exploring how this critical knowledge could be shared without fear of conflict was the method for doing this. There may be data protection and security issues for the organisation in this process and incentives may be required by the possessor of this specialist tacit knowledge before he or she will share or transfer it.

To enable the 'implementation of a qualification scheme', the organisation must work with the professional institutes to ensure that the sustainable knowledge-sharing programme that is created

is recognised by professional institutes and providers of third level education. This process may include a suggested ‘next academic step’ for all employees. In this way all staff may benefit from the supported exposure to further training and education.

To ensure all employees in the organisation receive equal treatment the presenter used the APC model as a basis for equal educational opportunity for all surveying staff. The SCSi Education Director set out to address, discuss and give advice on the ten most common reasons for APC referral. The presentation analysis is supplemental to Chapter 2 (See Section 2.8.5) which provided an initial overview of the common reasons for APC referral.

His presentation, which was a PowerPoint presentation with bullet points, is summarised below in Box 4.14. The bullet points are shown in respective boxes and the comments of the Education Director are summarised below the box.

Box 4.14 Overview of reasons for referral of APC (Assessment of Professional Competence)

- Final Assessment – two-part process: documentation and interview
- Assessors take a holistic approach to the Final Assessment
- Apart from the ethics competency, candidates are rarely referred on the basis of one item

4.12.1 Candidate not referring to APC resource material

The Education Director said that feedback from referral reports and APC post-assessment briefings indicated that there were *common areas* where candidates failed to satisfy the assessors. These failings were seen across all professional groups. The Education Director said it was important that APC candidates were aware of the points made in Box 4.15 below.

Box 4.15 Contributing factors to the referral of APC

- Not Referring to APC Resource Material.
- Key resources and where to find them are shown below:
 - APC guides and templates – available online
 - Pathway guides – available online
 - Website Information – and updates
 - Correspondence from the Education Department – SCSi advise to read carefully

The presenter explained that, while this is almost too basic to mention, it is very common that many candidates are not familiar with the APC process and requirements This occurs at the start

of their APC and also when they apply for Final Assessment. Therefore, it is important that all candidates read the guides and templates on the SCSi website. These guides and templates clearly set out the requirements for the APC. They state what is acceptable and more importantly what is not acceptable. Candidates who did not familiarise themselves with this information at the start of the APC process can easily make an incomplete or incorrect submission. This rendered them ineligible for the Final Assessment and/or being referred at the interview stage.

The Education Director said that the Guides set out the competencies and levels for each pathway, the requirements with regard to the Critical Analysis, counsellor reports, PQSL record and logbook requirements.

Also included on the website are the SCSi Pathway Guides. These set out the requirements for each pathway, including the competencies and their levels in the context of the individual pathways and the work that a surveyor undertaking that pathway would reasonably be expected to carry out. Membership of the SCSi entitles access to the website and all the information resources on it. Information relating to APC and Final Assessments is regularly and appropriately updated. The SCSi Education Department issues education news circulars to all members with policy announcements and reminders. The Education Director said this was the only way to communicate with the large membership. He said it was the candidate's responsibility to read these circulars in order to be aware of any policy or deadline information.

4.12.2 Poorly Presented Documentation

The next topic discussed by the presenter of this workshop was 'Poorly Presented Documentation'. The presenter talked about the topics cited in Box 4.16.

Box 4.16 Detailed reasons cited as 'poorly presented documentation'

Examples of basic mistakes and presentation errors:

- Grammar
- Spelling
- Overall standard of presentation

The Education Director said that this issue has become more prevalent in recent years and features more regularly in referral reports across all professional groups than it used to. He said that the physical presentation of documentation is the first impression that assessors will have of the candidate. First impressions are generally sustainable and indicate to assessors just how seriously

the candidate is taking the process, and how professional they will be in their written correspondence and presentations as a future chartered surveyor.

He said it was imperative that candidates sought colleagues, friends or family to review the documentation, not only for content, but also for the purposes of spotting typing errors and other similar mistakes. He said that candidates must also do a spell-check of all documentation. He indicated that for many candidates it might be worthwhile considering a course or self-directed study on the topics of preparing presentations and writing for business purposes.

4.12.3 Submission of Weak Critical Analysis

The ‘Critical Analysis’ is considered the cornerstone of the APC and is a precursor to the interview. The presenter’s notes of advice on the Critical Analysis are shown in Box 4.17:

Box 4.17 SCSI Education Director’s Notes of Advice on the APC ‘Critical Analysis’

- This is a critical component in the APC process. Candidates can be questioned by the panel on this element for 20-30 minutes.
- The candidate has the opportunity to prepare for this area and demonstrate where they can display knowledge.
- Knowledge and familiarity of supporting documentation for the interview will greatly assist the candidate.
- Candidates should carefully study and analyse the SCSI guidebook when preparing for interview.
- The panel may carry out several interviews on the same day. Candidates should not submit a bland or predictable text as it will not assist during the interview process.
- The panel will question the candidate on lessons learned during the preparation of critical analysis.
- Critical Analysis must be relevant to the candidate’s APC pathways.
- Critical Analysis must demonstrate how the candidate dealt with on-the-job problems, sought advice, resolved issues and reached a satisfactory outcome.

The Education Director said that candidates were taking a great risk if they submitted a weak Critical Analysis. They were entering the interview at a disadvantage and disadvantageously and would have to excel in all other areas if they were to stand a chance of passing the APC.

He said it was also extremely inadvisable for candidates to use a colleague's Critical Analysis as the template for their own, even if the predecessor had passed Final Assessment. Their Critical Analysis may have been the weakest component of their Final Assessment.

The presenter said that candidates should ensure that the key issues were clearly laid out and were actually key issues, and not just a narrative account of events which occurred during the project in question. He said that candidates should outline their involvement in the options for each key issue, as most times the option taken is the one that the Employer has decided upon and the candidate has little understanding as to the consequences in terms of programme and the budget.

Candidates were advised to exercise lateral thinking when selecting key issues from their Critical Analysis project.

A second set of points about the Critical Analysis made by the Education Director are set out as bullet points in Box 4.18.

Box 4.18 Second set of points about Critical Analysis made by the Education Director of SCSI

- Assessors will use the Critical Analysis as a starting point to question beyond what the candidate actually did, probing the candidate's understanding of the wider issues.
- Candidates will need to think about potential questions from the assessors while they are preparing and writing the Critical Analysis.
- Candidates are advised to focus on matters that pertain to the entire project.

The Education Director emphasised to the workshop participants that candidates should ensure that their submissions can be easily understood by a party who has not been involved in the project. Candidates were advised not to give the panel new hand-out notes before their verbal presentation as the panel may become distracted by new documentation.

4.12.4 Lack of preparation

The next stage of the workshop presentation dealt with the lack of preparation for their interview by APC candidates.

Rehearsal of the presentation and mock interviews were discussed.

The Education Director said that it was imperative that a candidate's first experience of the final assessment interview would not be the actual interview itself. He said that candidates must make

sure that they rehearsed their presentations as timing is critical. Ten minutes is the norm. He said it was as important not to be under time, as it was not to be over the time limit.

Candidates were urged to be mindful of good presentation skills, *i.e.*, speak clearly and audibly, make good eye contact and present as if they were presenting to a client or a meeting of colleagues. The Education Director said that candidates should consider attending a course in presentation skills, if they thought that this might be beneficial.

APC candidates were also advised to ensure that they arranged at least one mock interview. The presenter said that it would assist them in preparing possible answers and would also help alleviate nervousness on the day. The Director said that if a candidate could not organise a mock interview, the Society would assist in arranging a session with experienced APC personnel. He said that candidates should be encouraged to practice talking about their chosen project out loud. He noted that often, particularly for the younger candidates, they may not actually have had much experience of this activity, so they needed to practice and hear themselves. He said it was not a good practice to learn answers to questions off by heart, but by having discussions with peers and colleagues would help in getting used to a good way of structuring answers to the APC panel's questions.

4.12.5 Inadequate Pre-Qualification Structured Learning (PQSL) Record

This PQSL record is the opportunity for the APC candidate to display an element of organisation in keeping adequate and relevant diary entries of training. The minimum requirement for the PQSL record is 48 hours of PQSL per 12-month period. At the APC interview, this is reviewed by the assessors. The assessors look for

- evidence that a candidate has taken a well thought out, planned approach to gaining meaningful structured learning.
- PQSL activities which can include lectures, workshops and seminars, in-house training, site visits, self-directed reading and research, postgraduate study and even voluntary work.

The objective of PQSL is the same as CPD, for which it is a precursor. Surveyors, as members of a professional body, must demonstrate an ongoing commitment to updating their interpersonal, business-related and technical skills.

PQSL must be linked to mandatory and technical competencies, and it must be gained from across a range of media. The 'PQSL Record' must not be over-reliant on particular forms of attainment such as reading periodicals and site visits. The presenter said that 'over reliance' on particular forms of attainment had been increasingly mentioned in referral reports.

The Director said that candidates should regard the PQSL as an opportunity to support their work and attain the levels of competency required for satisfactory completion of the APC.

He said it was important for candidates to remember the activities that they had listed in their submission. This would be necessary to answer questions at the interview stage.

4.12.6 Competencies – Core and Optional Competencies

The Education Director stated that the written submission of core and optional competencies allowed candidates to confirm that they had achieved the required levels of their chosen competencies.

His main points are summarised in Box 4.19.

Box 4.19 Education Director's comments at workshop about core and optional competencies

- The objective of the Final Assessment is to confirm that the candidate has achieved the competencies of their chosen APC pathway: logbook; record of progress; PQSL Record and Critical Analysis.
- It is important that the candidate fully understands the competencies of their pathway, the levels to which they are set, and how they will demonstrate this in the documentation and at Final Assessment interview.
- For many APC pathways, there is a set list of core competencies and no element of choice.
- Core competencies – technical skills that the professional group deems essential in order for a candidate to become Chartered in that area of specialism.
- Many candidates present for Final Assessment without having attained their core element of choice – but important to choose wisely competencies to the required levels.

The Education Director also said that it was most important for candidates to “tabulate and clearly set out” their experience in their written submissions.

As an example of recorded experience, the Education Director said that if, for example, a quantity surveying candidate has undertaken a site valuation compilation in order to assist with an interim valuation for a project, he or she should clearly set out the process. This description would show how the candidate’s on-the-job training has on the job training had enabled them to reach a level

of competency for such a task. This analysis could include measurement accuracy and agreement, valuation of unfixed materials on site, detailed analysis of work completed since previous valuation and other similarly detailed procedures. This process helps prepare the candidate for questions on valuations during the interview.

Similarly, to assist the candidate in answering questions on a specific topic the following technique may help. For example, the question could be: *What would you look out for when carrying out a valuation for roof reinstatement works on a refurbishment project?*”

Suggested response: *“I have been involved in several refurbishment projects and this is how I would approach the valuation process”*. This way the candidate is in control of the response and shows confidence in delivery.

4.12.7 Lack of Experience

Candidates may vary in their experience, consequently SCSi and RICS have facilitated admission to APC depending on experience. Therefore, lack of experience would be a major disadvantage for candidates.

The Education Director said that lack of experience as a feature that might strongly affect the completion of the APC was most pertinent to candidates undertaking ‘Graduate Route 1’, (the 24-month APC). He noted that 24 months was a *minimum* time period and the ultimate test was whether the candidate had attained the required competencies to the required levels. He said that before the APC interview, this judgement must be made between the candidate and the counsellor. The counsellor can only sign that the candidate has reached the competencies required to progress to the APC interview if he or she is satisfied that the competencies have, in fact, been reached.

4.12.8 Ethics

Questions relating to ethics and how to deal with them also formed part of this presentation about the causes of referrals in the APC process. The talking points referred to by the Education Director of SCSi during his presentation are shown in Box 4.20.

The Director said that candidates often forget the importance of the ethics element of Final Assessment.

Box 4.20 Ethical questions and the APC Final Assessment

- The lack of appreciation of ethical issues and practices are appearing more and more in referral reports.
- Failure to demonstrate an awareness of and willingness to act in accordance with the Society's code of conduct will result automatically in a referral.
- A candidate wishing to become a member of a professional body, such as SCSl, must be aware of and willing to act in accordance with the body's code of conduct.
- Stand-alone questions by the Chairman at the end of the interview.
- However, the panel will be mindful when reading the documentation and listening to the candidate's answers throughout the interview of indications that they are aware of the ethical implications of their work and the requirements of the SCSl.

4.12.9 Further Practical Advice

Towards the end of his presentation, the Education Director provided a sample of standalone questions that may be put to the candidate. Some typical examples are included in Box 4.21.

Box 4.21 Some examples of stand-alone and common questions that may be put to candidates at the end of the APC interview plus some other tips

- Why do you wish to become a member of this organisation?
- What does it mean to be a Chartered Surveyor?
- What are the requirements for Professional Indemnity Insurance?
- What are the CPD requirements, and what counts as CPD?
- Conflicts of interest.
- Quoting fees and implications of same.
- Gifts and inducements to a Quantity Surveyor.
- Behaviour at interview also falls under the heading of ethics, as they should behave in a manner that is appropriate of a Chartered Surveyor.
- Unacceptable: Bad language and inappropriate behaviour.

The Director explained to workshop participants that nervousness is understandable and accepted as a given. However, he said it was imperative to approach the interview in a fully professional and non-confrontational manner.

4.12.10 Not Following Advice in Referral Report

Another common reason for the referred candidates at their second or subsequent APC Final Interview was that they had not followed the advice in the original, or subsequent, referral report.

A summary of the advice proffered on this topic, which is taken from the PowerPoint presentation of the Education Director is shown in Box 4.22.

Box 4.22 Advice offered to candidates who had been referred at the APC interview

- Referred candidates must read, understand and act upon the information contained in the referral reports.
- Subsequent assessment panel will be seeking to confirm that all highlighted issues have been addressed.
- The panel will investigate the most common reason for a candidate to be referred a second time or more.
- Those referred more than once must make contact with an APC Doctor.
- It is not a competition; it is a process to examine competency and experience of candidate.
- Prepare sample experience in respect of each competency.
- Candidates are encouraged not to waffle or ramble on in conversation.

The Director said it can often happen that candidates answer questions but perhaps not the questions they were asked. So, he suggested that candidates should pause and think about the question before answering. After this he suggested that they think about an example where this was applied. He said that the assessors know the answers to the questions they ask, so waffling is not encouraged. The Director said that if the candidate does not know an answer, it is better to ask the assessor if a note can be taken of this and come back to it at the end. Better to move on and try answer as many questions as possible, rather than to focus on the one missed. He reiterated that the assessors take an overall view of the interview.

Candidates are advised not to absorb valuable time in the interview by taking too long to answer questions. The panel can only assess them on the information they elicit, and if they do not give enough answers and provide information to assess competency level, then the panel will not be able to pass the candidate. Similarly, candidates may be wasting their own time in giving global answers.

4.12.11 Pitfalls in Preparation and Questions from Experts

Advice about preparation for the APC interview was provided by the Education Directorate of SCSi and is listed as bullet points in Box 4.23.

Box 4.23 Summary of advice about preparation for the APC interview and the answering of questions in it

- Consult with other candidates; study group/buddy system to bounce ideas off each other.
- Present in a formal manner to your supervisor, counsellor and other colleagues.
- Get them to ask you questions – will help eliminate surprises and assist with preparing answers for difficult questions.
- Mock Interviews are usually very helpful and encourage a professional approach.
- Should be conducted in a formal manner in an appropriate setting.
- A note to experienced candidate – do not rely on experience alone.
- Questions will be focused on candidate's areas of expertise.
- If the candidate does not understand a question, they may ask for it to be repeated and then advised to listen carefully.
- If the question is rephrased it is usually to assist the candidate.
- Candidates are advised not to give monosyllabic yes or no answers.
- Equally do not waffle and do not delay any answer.
- Do not panic if the candidate does not know the answer to a particular question – opportunity to return to it at the end of the interview.
- Use questions/answers to demonstrate full range of the candidate's knowledge and ability to put that knowledge into practice.

4.12.12 Questions from the Candidate

In his final remarks, the Education Director of SCSi said that it was normal at the conclusion of the interview to ask the candidate if he or she had any questions. He said that any issue that the candidate wished to clarify could be done at this point and also that candidates may wish to return to a question that they did not answer during the main interview and clarify a point

The presentation part of the workshop ended here. It was followed by a ‘breakout session’.

4.13 Breakout Session following MTP 3

This breakout session related to the session on ‘implementation of a qualification scheme’ for the MTP presentations on ‘creating a knowledge transfer and knowledge retention programme was held at the offices of one of the candidates for the APC Final Assessment.

Both the topics included in the session were supported by the SCSi and a cost consultancy practice.

The speakers were the Education Director of SCSi and the HR Manager of the cost consultancy practice.

The participants were given the five prompts listed below to stimulate the required feedback and comment:

1. “Did you feel the workshop group, including the extended group of attendees benefitted from the presentation on APC referral reasons? Is there support out there from SCSi and employer for APC attainment. Was the open discussion a platform for constructive comments/criticism *etc.*?”
2. “Discussion on further education/qualification attainment scheme – did you feel both personally and as a group that there was interest in pursuing further education/qualification.”
3. “Is there an appetite, personally and inhouse for masters/doctorate qualification attainment?”
4. “How did this workshop relate to practical support and tacit knowledge for you personally?”
5. “Did you consider it a privilege to attend this workshop and receive this information and knowledge or was it just another talk?”

4.13.1 Summary of Workshop Three

Of the three workshops carried out up to this point in the process, this third workshop proved the most popular as it attracted the interest of all APC candidates within the organisation. As can be seen from the positive comments, the SCSi members both pre- and post-APC considered the talk very beneficial for getting through the process. All participants found the workshop informative and the round table discussion that followed clarified and allayed many worries and fears of attendees. As the SCSi usually hold one mock APC to help candidates before they attend their

APC Final Assessment, this allowed the extended group the opportunity to question the educational officer directly in a smaller forum.

The appetite for further education, including Masters degrees and Doctorates, seemed strong. The main constraint seemed to be the study time required for such a commitment while still retaining a good work-life balance. As most of these young men and women are extremely busy, have an active family and home life and some are parents, such a commitment is a very big decision to make at this point in their careers. As with the other workshops, this process could have been repeated in an iterative process to allow APC candidates to share experiences with peers and colleagues before mock interviews ahead of the APC Final Assessment. All candidates confirmed it was a privilege to attend the workshop and found the outcome very helpful and informative.

4.14 MTP Workshop 4

Workshop four was the final session to investigate the knowledge gap identified as ‘how do other professions transfer tacit knowledge to their graduates?’. The chosen profession was chartered engineers. The chosen mentor was chair of mentoring and executive coach for Engineers Ireland. The brief was similar to the other workshops. The researcher met with Engineers Ireland in advance to discuss the process for mentoring engineers in the construction and technology sectors. The speaker stated in advance that her presentation covered both mentoring styles and techniques used to transfer learning and knowledge for graduate engineers. The presentation she made was similar to previous talks to accredited companies who wish to become members of Engineers Ireland. Engineers Ireland has a membership of over 25,000 members for CPD updates on training and learning.

The speaker defined mentoring in organisations as “a specific relationship between two individuals based on a mutual desire for learning and development. It is a non-reported form of assistance and replaces none of the organisational structures in place. Its functions coalesce around knowledge exchange and behavioural change”.

4.14.1 Mentoring organisations

Over 200 companies and organisations are accredited members of Engineers Ireland. Members include large multinationals such as Google, Facebook and Intel who seek out mentors for their professionals. As shown in Figure 4.22, the appointed mentor investigates the organisation’s corporate strategy and works together with senior management to monitor the business plan and assess Key Performance Indicators.



Figure 4.22 Mentoring a Strategic Fit (Engineers Ireland, 2019)

Once this has been done, the mentors then ascertain whether the company has the competencies to deliver its strategy and how it may develop these competencies in an effective and manageable way. Once competencies are identified then an effective mentoring programme can be initiated.

The speaker explained that the norm for an effective mentoring programme for engineers is five or six sessions over a period of one year. Each session usually lasts no longer than an hour. The mentees can request further information and clarification at any time between these mentoring sessions. The speaker also explained that mentoring has a positive connection with job performance, enhances career and employability opportunities, builds a positive effect of commitment to the organisation and promotes a flatter organisational structure.

The speaker explained that the aim of mentoring is to build a relationship through learning and development. She said that the mentor should be sincere, discreet and professional. The sharing of knowledge and life experiences should be the kernel of each mentoring session. The mentor should not be over reliant on continually giving advice. The mentor should be non-judgemental, open-minded, a good listener, be a good questioner, and be patient, upbeat, understanding and assertive. The speaker said that being a good mentor is a craft and allows an experienced professional to influence team building through leadership and understanding.

4.14.2 Mentor types

Matching the mentor with the mentee(s) is an onerous task that Engineers Ireland undertake once they have assessed the mentoring requirements in the way shown in Figure 4.22. The speaker identified four different mentor types:

The first is ‘the activist’. The ‘activist’ mentor deals with crises and dramatic experiences; gets involved with teams to solve problems; chairs and leads meetings usually with a strong visible presence; manages role playing and competitive teamwork tasks.

The second is ‘the reflector’. The ‘reflector’ requires time. The time is used to question, listen and read about the assistance and support required. This type of mentor interprets new concepts based on rationality and logic and works with activities and tasks that are part of an existing system or concept.

The third is ‘the theorist’. Like the ‘reflector’, the theorist requires time to consider and mull over problems or issues before taking any action. The theorist carefully prepares itemised reports about the situation and observes other people perform the report recommendations.

The fourth type of mentor is ‘the pragmatist’. The ‘pragmatist’ actively draws up plans to give advice and support; provides expert coaching and seeks feedback. The ‘pragmatist’ looks for any obvious link between his or her work and then applies what has been learned in a practical way and offers a workable solution.

Having matched the mentor with the mentee the speaker suggested the chosen mentor should have a ‘reflection checklist’. She said that this helps the mentor to: listen carefully to the discussion; be aware of non-verbal communication; stay in tune with core issues; not be distracted from the main topic; ensure the mentee remains engaged; encourage mentees to move out of their comfort zone; plan actions to achieve manageable goals; filter information and comments effectively and not summarise or evaluate too quickly.

The speaker concluded by stating that mentoring is akin to a complex motorway system; the majority of users may not understand how its connected; each person has their own journey and it usually takes longer than envisaged. Similarly, while mentees want the mentor’s specialist information and knowledge, they may still map out their own course.

4.14.3 Round table discussion following workshop four

Following the final presentation, the five participants discussed the potential benefits and caveats in relation to an in-house mentoring process. In general terms, most professionals welcomed the

receipt of useful knowledge to enhance their skills. The researcher commenced the discussion by identifying five stages of knowledge transfer as set out by Eraut (2004), in which knowledge is identified, the new situation is appraised, and appropriate knowledge identified as relevant is transformed to fit with the current situation. This is then integrated with other knowledge and skills in order to act in the new situation. In general, all in attendance agreed with this statement but it was also agreed that emphasis must be on the usefulness and appropriateness of the knowledge.

The comments of individual participants are set out below.

A final round up discussion was held with five workshop participants to comment on design of a bespoke MTP for Quantity Surveyors. This consisted of a number of open questions to review the four workshops in terms of content: What did they (the participants) get from the four sessions? Did it enhance their understanding of tacit knowledge transfer? Did they learn from the sessions? Did they benefit from the sessions? Did it assist and accelerate their knowledge transfer and, finally, was it worth the participation for the betterment of tacit knowledge transfer and how can it become a framework model for the future? What negatives, if any, did they take from the session? Would they change the format? The final question was: Based on your experience of the four workshops how should a bespoke MTP for Quantity Surveyors be designed? The responses of each of the five participants are shown below.

Participant one

I found workshop one most beneficial and was an excellent way to set out a checklist to manage and monitor relationship building with a client or contractor. I have used it several times since and found it beneficial to study before a meeting, I've used it as a mnemonic during meetings and endeavour to score points to help build towards a positive working relationship. I was not aware of this previously and that was, for me the most valuable positive I took from workshop one. Both presenters were experienced mentors and were an excellent choice. I think the other mentees enjoyed the mix of presenting styles and both exuded confidence and experience which transferred to all in attendance. It was great to have access to such experts in a small forum.

Negatives include "the session was too short and restrictive". Speaking with others afterwards we would have benefitted from a repeat session to test some of the points and issues raised. I also felt the seven gaps in training were foisted on us and I would have preferred to have included my own personal training gaps such as BIM training for future inclusion in a monitored and supervised workshop. In a way it was like bringing a classroom to your workplace for a specific problem to be resolved in an open and transparent way.

The second workshop was perfect for some in the session but not for individuals who had previous roles with contracting firms. The speaker raised many thought-provoking issues which a Chartered Quantity Surveyor may not have had reason to consider previously. The second workshop was structured in a very balanced way showing how the QS must take the estimator's file and handover brief before the QS can assess the pros and cons in order to work towards a sustainable profit margin for the contractor. I found this session too long but the majority in attendance had the opposite opinion. I think if we had a brief synopsis beforehand, we could have included our individual queries.

The third workshop was very different as it allowed first-hand direct access to the Education Director of SCSi/RICS our professional awarding body for Chartered Quantity Surveyor status. I felt this was a great privilege particularly for those about to sit the APC. Our company holds mock interviews plus SCSi facilitate with a mock interview before the APC. The expanded attendance was indicative of how popular this session was. The length of the question-and-answer session was indicative also. The open discussion afterwards on pursuing further qualifications including Master and/or Doctoral degrees had the same reaction Yes, we are all interested but we need time off work for such activities.

The final workshop four was interesting to see how chartered engineers used general and specialist knowledge transfer as a combination to advance their learning. Continuous CPD, providing technical, commercial and managerial support appears to be more proactive as compared to the training we receive. If the guidelines for mentoring engineers could be applied to a structured self-assessment CPD for Quantity Surveyors, I think we would feel that, as a group or workforce we could participate and communicate better within our practice.

Overall, I think the positives outweighed the negatives and I see great benefits for us as individuals to have access to experts for problem-solving, but the solutions need to be measurable, the company must buy into it and the individual must have an opportunity to have continuous access after the session to clarify any issues raised. To have this flexible facility would allay a lot of training and information sharing fears.

Participant two

I found the four workshops very helpful but would have thought our immediate supervisors should have been in attendance. That way the organisation would probably get a better feedback which would have carried more weight. If we are to adopt this type of training, I think we should be the selectors of experts and/or mentors or at least have access to a range of available expertise. I

hadn't realised how emotional intelligence and tacit knowledge could play such a wide role until we completed the presentations.

I found the first workshop too short. There was so much in the communication skills and personality types I think would have needed two sessions but enjoyed it, nonetheless. Of the five of us in attendance I think I got most from it as I'm very much involved in face- to- face negotiations and conflicts with main contactor's surveyors and this workshop one enabled me to stand back and consider how to approach the other side in next phase of tactical negotiations. The second workshop from contractor's QS perspective was very interesting to see through the lens of a fellow professional but deals with different challenges as contractors' goals are profit and reputation driven. The aspect of health and safety was a significant cost factor for the contractor to consider but not really a primary cost factor from the consultant QS perspective. There were many similar examples that the presenter alluded to which were valuable information for future project compilation consideration.

Now that I'm considering APC application as an experienced QS the session workshop three with SCSi was refreshing and answered many questions for me. It was relevant for both the team and the colleagues who joined the session as they were due to sit the APC interview shortly after the workshop.

Workshop 4 was interesting, but I think the training and learning requirements for engineers and surveyors are quite different. Engineers should have mandatory CPD for issues such as safety in design and updates in design standards which may be life-threatening whereas I cannot think of situations where a QS performance would have such liability. However, I did find the discussion on the variety of mentor types and their approaches to training fascinating.

In summary, the four workshops were enjoyable and the post-mortem session after each event allowed us the opportunity to freely discuss the relevance to us as individuals and to see how our practice could respond to the formation of a mentoring programme

Participant three

The first workshop was a good indication of how much information is out there. We as Quantity Surveyors may be guilty of relishing in repetition and enjoy the obvious benefits of striving to be better each time. The old mantra "you are only as good as your last project" may be true but if we don't push ourselves as individuals, we are in danger of becoming stale and lethargic. The communication skills and ability to ask relevant questions were pertinent to a chartered surveyor's

role in the construction team. If this workshop is indicative of how an MTP would work, I agree that it was a great success. It could be improved by having at least one further session when the attendees have had the time and opportunity to digest the topic and raise their own questions later.

The breakout feedback sessions proved beneficial as they allowed confidential and informal discussion with the facilitator on how the next workshop could be changed or presented. The second workshop may have benefitted from a split session with another experienced chartered Quantity Surveyor working alongside the contractor QS as a double act. Then the attendees would have had a full flavour of how the role of a site-based QS is both perceived by the professionals and what the contractor expects from his QS. To restructure the workshop would take two sessions or a longer session with a break for lunch etc.

The third workshop did prove popular with APC stage QS graduates, but it also informed the more experienced present of how the standards for sitting the APC are maintained. The second part of this presentation allowed a round table discussion to take place regarding future study and how it could be structured with the support of the practice. The same comments were repeated by many in attendance i.e., “we’re too busy”, “who pays for the course”, “what is the endgame for further qualification”, and “would the practice allow study time when required”?

I cannot report any real negatives except that a design for future workshops or programmes would have to include senior management at board level to fully appreciate and communicate to the highest level what the employees at the coalface are grappling with on a daily basis. The next phase of design should also include the SCSi for CPD points and recognition of extracurricular study.

The final workshop four provided us the view of how an engineer’s training is assessed by their profession. It appears to be more rigorous and I would argue that they may feel more inclusive and participatory than Quantity Surveyors. Their programme seems to take the company strategy into consideration from the start and how their competencies are developed in an effective manner. If there was a negative the workshop seemed to target the mentor and not the mentee requirements. But I did benefit from the session.

Participant four

I felt the construction expert and the PR expert in the first workshop were a good mix. They bounced off each other very well and the interaction between them helped me remember and identify certain aspects of their presentation. The element of building positive working

relationships is relevant for me personally and my career at present. I'm not so sure if the younger less experienced attendees got the same value from the event. Would have preferred more time with the non-construction PR man to hear him expand on building relationships in non-construction field. A repeat workshop with both presenters would have clarified some of the detail plus a round table discussion would allow all in attendance express their own experiences.

The second workshop with the QS was a revealing session with the variety of practices to improve profit margins and lay a base foundation for variations on a daily basis. This is not something we can learn in college. This is hardworking and hard-earned contractual claims science. Issues such as RFI summaries, front-loading the programme, seeking out under measures to exploit etc. were interesting techniques not in the mindset of a cost consultant QS.

The third workshop proved to me that the SCSI should establish more training roadshows. If you live in Dublin city you can reasonably easy attend evening CPD workshops. This intimate workshop was a great example of almost one to one mentoring. The topic of APC achievement will always be topical as achieving status of a chartered surveyor is a prime career goal for most Quantity Surveyors.

Negatives included brevity of time allowed for each topic. If we have the opportunity to design our own MTP workshop, then we could suggest certain invited mentors with proven experience with the mentoring required. The topics could interlink with each other and on conclusion of a series of workshops we could apply for CPD points to make it worth everybody's time and effort.

The presentation in workshop 4 revealed how mentoring is a craft and how the characteristics of the individual mentor could dictate the effectiveness of the mentoring session. It was fascinating to discover that the mentoring techniques could vary so much from individual to individual. To me, this proves the professional is at the mercy of the depth and knowledge and choice of the mentor. If our practice was considering implementing an MTP I think serious debate should occur about the choice and purpose of the programme before embarking on such a venture.

Participant five

Discussing psychological warfare in business arose in both the first and second workshop. In the second workshop the contractors QS stated "you are not there to build relationships. You are there to make money". This is the first time I heard it explained so blatantly. Workshop one, speaker one equipped us with the tools to read other people's personality and how to examine our own personality. This allowed us the opportunity to view the various personality types from aggressive

to passive etc. How we perceive ourselves may not be how other people see us. If we understand where we fit in the Myers Briggs personality types, it can then help us assess the probable outcome from a meeting or dealing with negotiations on site.

A negative re the second workshop was the forum. I felt it would have been more effective if we had convened on site and perhaps see practical problems and construction related disputes. It would have benefitted us to walk through a construction problem as opposed to simply talking about it.

The inclusion of the SCSi in the workshop programme number 3 was a very good idea. It was common ground for most of us in the group. I think we should have included more CPD topic discussion and choice of topic. Members should have greater input in selecting what zones of coaching they require etc. I feel the SCSi concentrates too much on property mentoring for CPD purposes. Quantity Surveyors need to have a greater say in topic selection.

My input into designing an MTP mentoring programme would encourage pre-meetings with staff to assess what the vulnerabilities are and then suggest various options and specific experts to mentor staff at varying levels of experience. This will all cost money but surely there is an obvious long-term gain for the practice also. The other issue for establishing an MTP is the time factor. How soon can a relevant problem be addressed by an independent mentor. The frequency and length of each workshop is also critical. Will the practice allow time off work for MTP attendance?

The speaker in workshop number 4 was very interesting and gave a good account of mentoring for engineers but failed to show how these techniques could be tailored to Quantity Surveyors. Perhaps we should have had an input into what questions or curiosity we had in advance of the workshop. On the positives it was intriguing to see the personal traits that a mentor must display before setting out to address professionals from another discipline. Overall, the workshops were informative, and all attendees have shown respect and interest in each facet of the programme to date.

4.15 Implementation

Before embarking on structuring and designing a bespoke MTP for quantity surveyors a further consideration by Clark (2012) should be noted, from the perspective of the employee. This involves the mindset of the employee and the time and resources of the employer. If an employee displays energy, purpose and passion when carrying out their duties this should result in both personal job satisfaction and an increase in professional skills. Clark (2012) found that three

quarters of surveyed staff were not totally involved in their job. Many were either burnt out or bored and, in general, were waiting for their employer to get them engaged in a work activity. The balance of those surveyed displayed a very different mindset with characteristics such as:

1. They took deliberate steps to become engaged and became responsible for their own engagement.
2. They felt the least sense of entitlement and they saw their employability as being in their own remit.
3. They revealed a level of engagement when engaging with customers.
4. They displayed engagement in a variety of duties and at a personal level.
5. They sustained this engagement over a long period of time.

Clark outlines six behaviours that drive this employee engagement. These are characterised as (i) connect, (ii) shape, (iii) learn, (iv) stretch, (v) achieve and (vi) contribute.

1. **Connect:** Employees increase the number of connections to work, colleagues, and organisation.
2. **Shape:** While following organisational aims, they customise their experience based on personal preferences.
3. **Learn:** To keep skills up-to-date and maintain their organisational value, they acquire knowledge at or above the pace of change.
4. **Stretch:** They improve capability by extending their 'comfort zones' and going the extra mile to attain their potential.
5. **Achieve:** As employees attain more, they get more involved.
6. **Contribute:** These employees understand that aiming towards a purposeful goal develops engagement at a higher level.

According to Clark, business and personal relationships are part of a well-adjusted existence and ensure fulfilment. Being over-dependent on email, social media and other communication methods makes meaningful relationships more difficult to develop.

Using the various skills associated with conventional mentoring and coaching may involve a mixture of these tried and tested techniques to address the needs of a knowledge transfer programme.

The knowledge transfer process may be a combination of mentoring and/or coaching. The programme may select aspects of each discipline to suit the specific learning set. The differences are set out in Table 5.2.

Differences between Coaching & Mentoring		
Breakout	Mentoring	Coaching
Focus: -	Individual development	Performance improvement
Role: -	No agenda	Specific agenda
Relationship: -	Self-selecting	Comes with the position
Source of influence: -	Perceived value	Position
Arena: -	Life/Career	Business or Sport
Time Frame: -	Long term	Short term
Agenda: -	Open	Set
Orientation: -	Relationship related	Task related
Approach: -	Non-structured	Structured
Personal Objective: -	Improved performance	Personal satisfaction

Table 5.2 Differences between coaching and mentoring

Taking the various mentoring and coaching attributes applicable to a knowledge transfer programme the following may be considered:

Focus may be on both the individual’s development and/or seeking improved performance from the participant. A mixture of mentoring and coaching can provide focus.

Role would have to be specific in order to achieve knowledge transfer. Therefore, it is similar to coaching in this regard.

Relationship: The mentor would be appointed by the employer organisation but in agreement with the participants. Hence ‘relationship’ involves a mixture of mentoring and coaching.

Source of influence: While perceived as a valuable encounter for the participant the appointment is an engagement by the employer organisation. So, the ‘source of influence’ is considered a mixture of mentoring and coaching.

The arena is business but includes participant career development. The ‘arena’ is thus a mixture of mentoring and coaching.

Timeframe is medium to long term but not short term. Therefore, it is similar to mentoring in relation to this.

Agenda is an agreed pre-set form, similar to coaching.

Orientation is task related, similar to coaching.

Approach has a structured format similar to coaching.

Personal objective is both improved performance and participatory personal satisfaction.

In the light of the analysis above, the compilation of the MTP proceeded using an amalgam of coaching and mentoring skills. The seven gaps in professional training identified in Chapter 4 (Section 4.6.4) may be addressed as set out below.

1. Communication skills improvement and training.

With a combination of mentoring and coaching skills participants in the programme could be encouraged to make brief presentations at the workshop forums. The mentor or coach could ask each participant to develop their communication skills over a monitored period to display improved language in emails. Correspondence and report writing could be included in the programme. Face-to-face interaction would be encouraged in supervised sessions, to analyse how improvements could be made for each participant. Specialist communication training could also be imported into the programme with the approval of employer organisation and participants.

2. Asking relevant questions to accelerate knowledge transfer.

Organisations should encourage a questioning culture to demonstrate a strong commitment to the development of learning and knowledge transfer.

According to Marquardt, "Good questions make better programs or get us out of problems, whatever the circumstances are. If people on your team value what's important, why it's important, and what's the logic that drives us to do this versus that, then you've got a pretty good team. Once I'm comfortable with the way a team's decision process works and how the team members work together, that team will solve problems and deliver terrific results. But if a team isn't functioning well, I first ask why and then how we can change it to get better players in the right jobs at the right time. When the right players are in place, a solid team can be honest enough, curious enough, and interested enough to push each other on why our company is doing this, how it got there, and where it is going. Essentially, I want two sharpened edges in a team: critical inquiry combined with collaborative action. In fact, inquiry and collaborative action naturally go together. It is hard to collaborate with others without asking and answering questions. And asking and answering questions in a positive way naturally leads to collaboration." (Marquardt, *op cit.*, p.37).

In functions such as role play team players can possess an array of knowledge, wisdom, creativity and energy. Team leaders can best access this wealth of experience and empower their people by encouraging questions as a natural part of team discussion (Marquardt, *op cit.*).

3. Exposure to and experience of how the ‘other side’ of the project team operates.

Construction quantity surveyors may be keen to understand how professional team quantity surveyors carry out their duties. Further insight could be of benefit to the quantity surveying teams on both sides of the construction process. This knowledge could enhance and support options for career change if the need arose in the future.

The programme could include a split of participants between site-based and office-based participants. If the alternative sessions between the monitored sessions were site based with the more site experienced personnel proving peer to peer coaching, the participant could benefit from exposure to site workings in a less intimidating training environment.

4. More site experience to support technical knowledge and training.

Participants in the knowledge transfer programme, especially recent graduates may suffer from lack of site and practical experience. The programme could include an element of site exposure. Examples of inclusion in the programme could deal with practical issues such as site health and safety procedures, setting up site accommodation, welfare and security of when working on site, insight into waste on site and how it is dealt with compared to how it was provided for in the tender. The MTP could arrange for alternate sittings to be held on site, either through the employer organisation, peer participant’s sites or by arrangement with the workshop facilitator. Participants could be asked to compile a short paper on the experience of site attendance displaying aspects of new and useful knowledge pertaining to their desk job.

5. Creating a sustainable knowledge retention programme.

Examples of retaining specialist or critical knowledge could be a practice or firm dealing with specialist construction areas that do not transfer easily to lesser experienced firms. They may include markets such as specialist fit out contracting, data storage building and civil engineering firms specializing in projects involving water works, bridges and dams. All of this specialist knowledge must be retained by the firms or practices if they are to remain operable and competitive. Smaller and medium sized practices may focus on serial

market areas such as residential building or commercial developments. Organisations and HR departments could be encouraged to form a knowledge retention programme when MTP highlights knowledge loss risks and vulnerabilities.

6. Implementation of a qualification attainment scheme for all quantity surveyors in an organisation.

In cooperation with the professional institutes and societies, a programme could be established to strengthen and bolster the in-house knowledge of quantity surveying practices and firms to raise the entire qualification level for the practice or firm. The professional institutes have a vested interest in assisting and supporting this process and may become intrinsic to the MTP. Organisations may contribute with financial incentives as various levels of qualifications are attained.

7. Examining other professions and how they maximize mentoring and coaching programmes for the betterment of employees and organisational tacit knowledge.

The example given earlier of how the training of accountants was encouraged by an organisation to raise the standard in its regional offices could be used for graduate quantity surveyors. The training elements of professions such as architecture, engineering and accountancy may be analysed. The training elements of these professions could then be copied to design bespoke training segments for inclusion in the knowledge transfer programme for quantity surveyors. Comparable programmes such as simulation training for surgeons by the RCSI could be studied to seek out similar structures for quantity surveying training on simulated projects as part of the MTP.

The organisation's implementation of efficient succession planning should also be considered.

Larger quantity surveying practices and departments within large construction firms have an advantage over medium and smaller firms when it comes to succession planning. They usually have a team of personnel at various stages of experience and training who may be groomed for eventual promotion. HR departments may be charged with the responsibility of planning for replacement of retirees well in advance of the retirement date. Medium and smaller firms may have a family structure of family members at various ages ready to step into a more senior position. Otherwise, they are left to find replacements in the open market to fill the gaps created by retirees and people leaving the organisation.

4.15.1 Implementing a monitored tutelage programme for quantity surveyors

Having identified the stakeholders, studied the organisational training needs, researched the types and styles of knowledge retention programmes, considered the problems associated with rolling out a knowledge retention programme, the next step is to *test* the implementation of a bespoke MTP programme for quantity surveyors. The seven gaps discovered in this research can then be addressed by the compilation and organisation of mentoring workshops to address these training deficits.

The seven identified gaps were grouped into four MTP workshops. The goal of each workshop and a description of each workshop are set out below.

(1) MTP One

Goal: Communication skills improvement and training and asking relevant questions to accelerate knowledge transfer.

Description: A two-part workshop dealing with communication skills and confidence and ability to gain knowledge through asking relevant questions of peers and superiors. Research identified two experienced skilled mentors with a wide variety of PR and mentoring track record.

(2) MTP Two

Goal: Exposure and experience of how the 'other side' of the team operates. Construction quantity surveyors anxious to understand how the professional team quantity surveyor carry out their duties and vice versa. Further insight could be of benefit to both sides of the construction teams. This will also support career changing options if the need arises in the future. More site experience to support technical knowledge and training.

Description: Research identified a senior commercial director with a large Dublin based construction firm. His brief was to design his presentation to inform professional quantity surveyors of the roles, duties and responsibilities of a construction quantity surveyor. The tacit knowledge element included the knowledge and skills required to work on site as a quantity surveyor for a contracting firm. The participants and the HR Manager agreed to the chosen mentor and confirmed in advance that there was no conflict of interest relating to past or current projects between both firms.

(3) MTP Three

Goal: Creating a sustainable knowledge retention programme. Implementation of a qualification attainment scheme for all quantity surveyors in an organisation.

Description: Research identified that the PQS host firm had a number of candidates preparing for APC. Other members of the firm included quantity surveyors who were mature, very experienced but had not, for whatever reason achieved chartered quantity surveyor status. This two-part workshop consisted of the SCSI Education Director presenting the entry requirements and analysing the ten most popular reasons for referral. This workshop was a round table open discussion to evaluate the candidate's problems and anxieties facing APC. The second part of the workshop consisted of the firm's HR Manager discussing how the firm in conjunction with the SCSI/RICS in addition to employing specialist mentors support candidates pursuing master and doctorate qualifications. This support included financial and mentoring assistance from the firm.

(4) **MTP Four**

Goal: Examining other professions and how they maximize mentoring and coaching programmes for the betterment of employee and organisational tacit knowledge.

The range of professional organisations and associations who have bespoke mentoring programmes was discussed in advance of the workshop. The candidates thought that they would benefit greatly from a presentation by a construction related profession which explained how it dealt with the transfer of knowledge to graduates. They also thought they would benefit from finding out about CPD workshops for existing professionals. The eventual choice was to contact Engineers Ireland and source the person responsible for their mentoring programme. A senior mentor from Engineers Ireland presented and chaired a round table discussion as explained in the last chapter.

The four workshops are set out in Figure 5.4 later in this chapter showing how they interacted with each other. On completion of each workshop, the researcher met with the candidates to discuss their views of how the workshop had helped inform them (or not) about how the knowledge gaps that had already been identified, were filled. The HR Manager attended each workshop but was absent for the intermediate informal discussions.

The choice and selection of mentors for each workshop were agreed in conjunction with the five candidates and the organisational HR Manager. First, it was necessary to establish if the workshops would use mentors or coaches. Table 5.3 is based on the previous Table 5.2. It highlights the differences between the two approaches. The fourth column 'Elements' highlights what elements of each activity were selected to run each workshop. The eventual workshops were run on a mixture and amalgam of both coaching and mentoring.

Utilising	Mentoring	Coaching	Elements
Breakout	Mentoring	Coaching	MTP Role
Focus	Individual development	Performance Improvement	To prioritise the individual's performance
Role	No agenda	Specific agenda	Specific agenda
Relationship	Self-selecting	Comes with position	Selected by agreement
Source of influence	Perceived value	Position	Perceived value
Arena	Life/Career	Business or Sport	Life/Career
Time Frame	Long Term	Short term	Short Term
Agenda	Open	Set	Set
Orientation	Relationship Related	Task related	Both task and relationship
Approach	No-Structured	Structured	Structured element
Personal Objective	Improved Performance	Personal Satisfaction	Improved performance

Table 5.3 Utilising an amalgam of mentoring and coaching

The selected presenters identified themselves as mentors but as the record of their activities shows their performance crosses over into coaching. The researcher set about identifying individual mentors or coaches suitable to carry out the task of knowledge transfer and also acceptable to the participants and the organisation's HR Manager. The researcher compiled a list of potential mentors or coaches and an open conversation with all stakeholders developed to source the preferred parties.

It was decided to finalise a list of 'mentor coaches' for each element of each workshop but also have a standby presenter, in case a 'mentor-coach' was not available.

A final round up discussion was held with five workshop participants to comment on design of a bespoke MTP for quantity surveyors. This consisted of a number of open questions to review the

four workshops in terms of content: What did they (the participants) get from the four sessions? Did it enhance their understanding of tacit knowledge transfer? Did they learn from the sessions? Did they benefit from the sessions? Did it assist and accelerate their knowledge transfer and, finally, was it worth the participation for the betterment of tacit knowledge transfer and how can it become a framework model for the future? What negatives, if any, did they take from the session? Would they change the format? The final question was: Based on your experience of the four workshops how should a bespoke MTP for quantity surveyors be designed? The responses of each of the five participants are shown below.

4.16 Conclusion

This chapter set out to use the data findings and to consider and reflect on the various methods used for data collection. Referring back to the introduction of this chapter and the three evolving stages of data collection the key findings are summarised as follows.

From the pilot workshop

The workshop confirmed the need for mentoring for quantity surveyors. The mentors stated that personal tacit skills such as communication ability and interpersonal skills were lacking not just in the 4 participants but in the millennial age group generally. The mentees greatly appreciated the opportunity for both group and individual mentoring sessions to support their explicit and work skills. They also saw this opportunity as a support for those seeking chartered status in the SCSI/RICS. The conclusion from the workshop was the need for some form of a structured mentoring programme for graduate quantity surveyors

From the questionnaire survey with 56 postgraduate construction professionals the following training gaps were identified which could be addressed using a bespoke mentoring programme.

- Communication skills improvement and training.
- Asking relevant questions to accelerate knowledge transfer.
- Exposure and experience of how the “other side” of the team operates. Construction quantity surveyors anxious to understand how the professional team quantity surveyor carry out their duties. Further insight could be of benefit to both sides of the construction team. This could also support career changing options if the need arises in the future.
- Greater site experience to support technical knowledge and training.
- Creating a sustainable knowledge retention programme.

- Implementation of a qualification attainment scheme for all quantity surveyors in an organisation.
- Organisation's implementation of efficient succession planning.
- Examining other professions and how they maximize mentoring and coaching programmes for the betterment of employee and organisational tacit knowledge.

From the four MTP workshops and various breakout session with the host company participants the findings were as follows.

MTP participants

- welcomed a structured in-house mentoring programme but only on condition that they could influence the selection of mentor and topic.
- were more at ease with agreement that comments and discussions following each presentation remained confidential.
- embraced change and expressed willingness to explore further knowledge transfer topics.
- following the second workshop which focused on how contractor surveyors operate MTP, participants noted that the mindset of site-based contractor quantity surveyors was radically different from their training to date.
- following the third workshop presentation by the SCSI education director, the MTP participants voiced their opinions on how the APC process could be restructured. This workshop proved to be the most popular and relied heavily upon the tacit knowledge and experience included in the education director's view as to why some candidates may fail the APC process.
- the final workshop was based on how chartered engineers dealt with the mentoring of their graduates was, in the researcher's opinion the lowlight of the entire process. Concluding the participants opined 'quantity surveyors and the SCSI do it better!'

HR and host company management

- noted that all MTP participants expressed interest in future leadership roles within the organisation.
- decided after the four workshops to review their induction, onboarding and exit interview processes.
- pointed out that the identification of knowledge gaps in the training of a QS led to a discussion at board level for a need to consider a framework for succession planning.

Having collected, analysed and summarised the data from the two research phases, the next phase is to implement and trial the findings. Analysis of the training gaps in the transfer of knowledge for construction professionals should assist in developing a response. This response can be in the form of a monitored mentoring programme for Quantity Surveyors. The gaps in training requirements can now be used as a model for establishing a Monitored Tutelage Trial Programme. The trial MTP emerged over the period of research from initiation to meeting the host practice and negotiating agreement to allow the author interview candidates for inclusion in the programme. Next the interview process in agreement with HR director, formulating the workshops and selected mentors including repeat and breakout sessions. Finally, the reflection phase of tacit knowledge transfer and final interviews with host organisation.

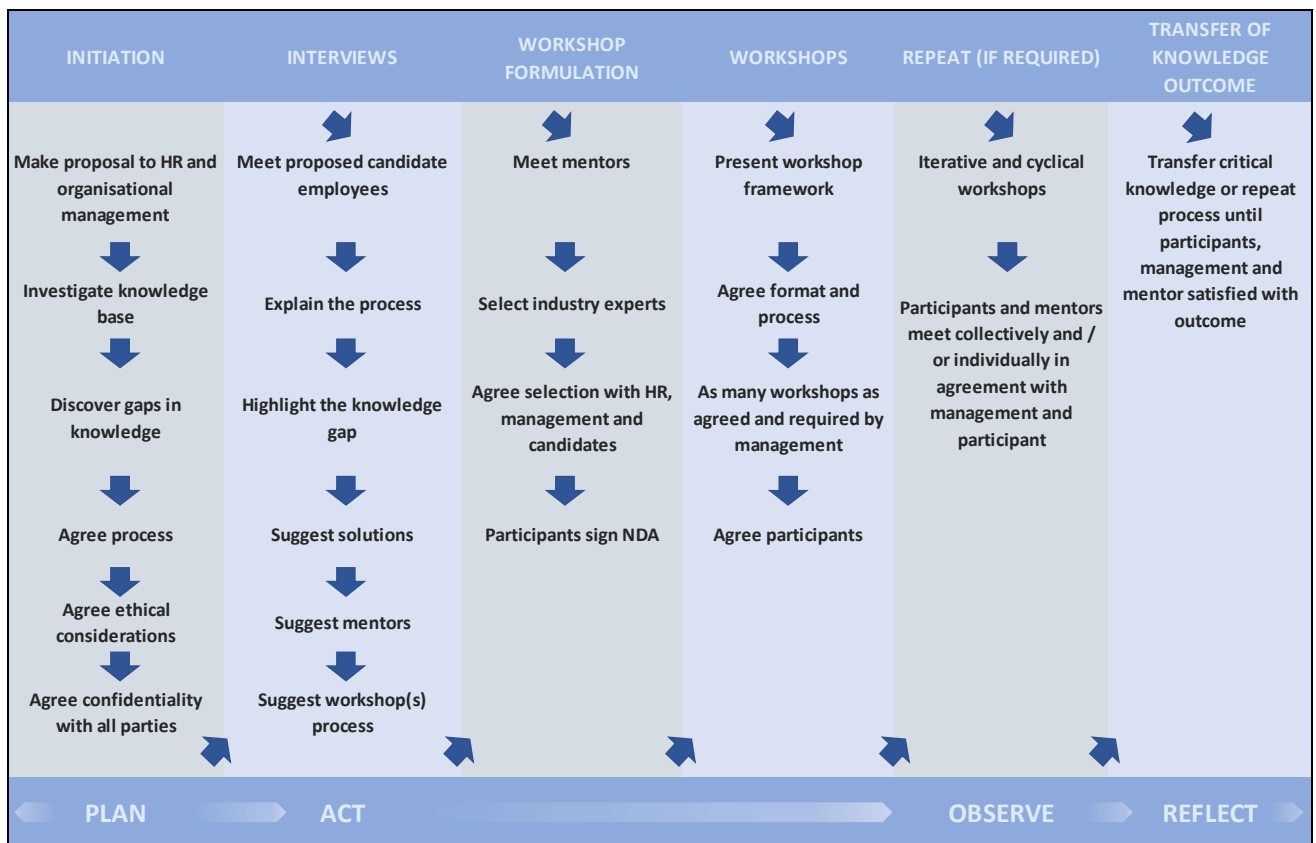


Figure 4.23 Emergent Monitored Tutelage Trial Programme process

Chapter 5 discusses:

- (i) the design and implementation of a knowledge retention programme and
- (ii) how it can be designed to develop an MTP specifically for Quantity Surveyors.

CHAPTER 5

DISCUSSION

5.1 Introduction

This discussion chapter interprets the meaning and significance of the data findings and results. The results come from the research methods and the research methods used derive from the original purpose of the thesis as set out in chapter one.

The purpose of the thesis, which was also set out in the research aims, was to determine if a suitable method for the transfer of tacit knowledge to Quantity Surveyors existed and if it did, had it been tried out, and, if not, could a method be tried and tested in a workshop forum.

The sequence of originating ideas was:

- tacit knowledge is an important part of being an experienced quantity surveyor,
- tacit knowledge is an important part of a firm's human capital and hence its competitive advantage,
- tacit knowledge is personal and may be lost if and when a person leaves an organisation or team,
- therefore, the transfer of tacit knowledge from those who possess it to those who do not possess it is an important process that an organisation should undertake.

This idea then developed into the three research questions:

- Is there a gap in the current knowledge and literature about the transfer of tacit knowledge to recent graduates?
- Is it possible to transfer relevant tacit knowledge from experienced professionals to recently graduated quantity surveyors?
- Can this transfer be done as an effective and worthwhile process?

Addressing these questions was the basis for the research methods that were used for this thesis.

These questions and the associated research methods used to address them are set out in Table 5.1.

The literature review showed that information about the transfer of tacit knowledge existed, in general. It also showed that there was some knowledge about the transfer of tacit knowledge in knowledge-based professions but very little in the quantity surveying profession.

RESEARCH QUESTIONS	METHODS USED TO ADDRESS THE QUESTIONS	ANSWER
Is there a lack of knowledge about the transfer of tacit knowledge in general?	Literature review	No
Is there a lack of information about the transfer of tacit knowledge in knowledge-based professions and specifically quantity surveyors?	Literature review	No but not much at all for Quantity surveyors
Is there information about the processes for the transfer of tacit knowledge?	Literature review	Yes
Is there information about processes for the transfer of tacit knowledge, especially quantity surveyors?	Literature review	No
Is there a demand from graduate Quantity surveyors for a method of transferring tacit knowledge?	Survey of class of graduate construction professionals	Yes
Is a monitored tutelage programme (MTP) a practical method for the transfer of tacit knowledge?	Action Research	Yes

Table 5.1 Research Questions and Associated Methodologies

In the case of processes for the transfer of tacit information, the literature review showed that tacit knowledge transfer in several professions had been studied and reported. The range of professions was wide, and each profession was different. However, in the case of quantity surveyors very little research had been published.

The literature review showed that there was a lack of knowledge about how to choose and develop a process for the transfer of tacit knowledge to graduate quantity surveyors.

If a process could be designed and implemented and proved successful in terms of its objectives it could be extremely useful. It would provide a method by which quantity surveying practices and other organisations could maintain their competitive advantage. For the participants, it would be a way of enhancing their tacit knowledge so that they could be more employable. This would provide a gain for both sides of the transfer process, which should ensure its sustainability.

So, the primary *aim* of the thesis is not only about the importance of tacit knowledge or its transfer or whether it is important for quantity surveyors. Its *main focus* is on the development of a process for the successful transfer of tacit knowledge to graduate quantity surveyors who may be working in different types of organisations.

The development of a suitable transfer process started with an investigation of the tacit knowledge requirements of graduate quantity surveyors. The next step was to develop the choice of method suitable for implementation. This was followed by the adoption of a research method which was appropriate for the investigation of the process.

The method chosen as the vehicle for the transfer of this tacit knowledge was a ‘monitored tutelage programme’ (MTP) and the method for investigating its suitability and outcomes was Action Research.

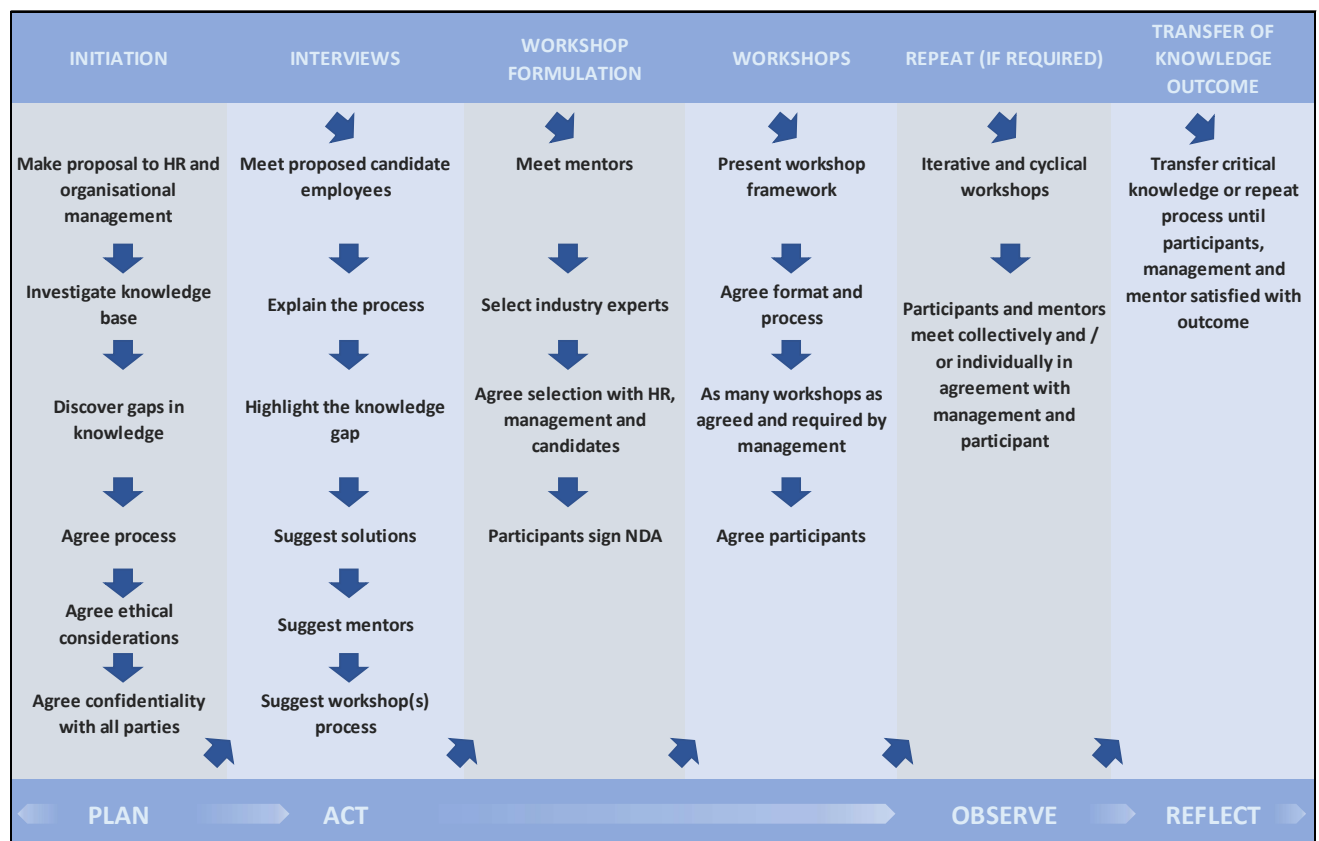


Figure 5.1 Monitored Tutelage Trial Programme process

The MTP method allowed greater focus and fine-tuning of information to the specific needs of quantity surveyors. The emphasis on two-way communication in the MTP method allowed for greater engagement, trust building, confidentiality and active learning than would have been the case in some of the other transfer methods which had been reported on and considered. It also allowed a quicker transfer than would have been the case in many ‘learning by doing’ models for the transfer of tacit information such as exist in older professions, such as law (by apprentices or ‘devils’), medicine (by Junior Doctors) and in the military (with a clear grading of rank and responsibility).

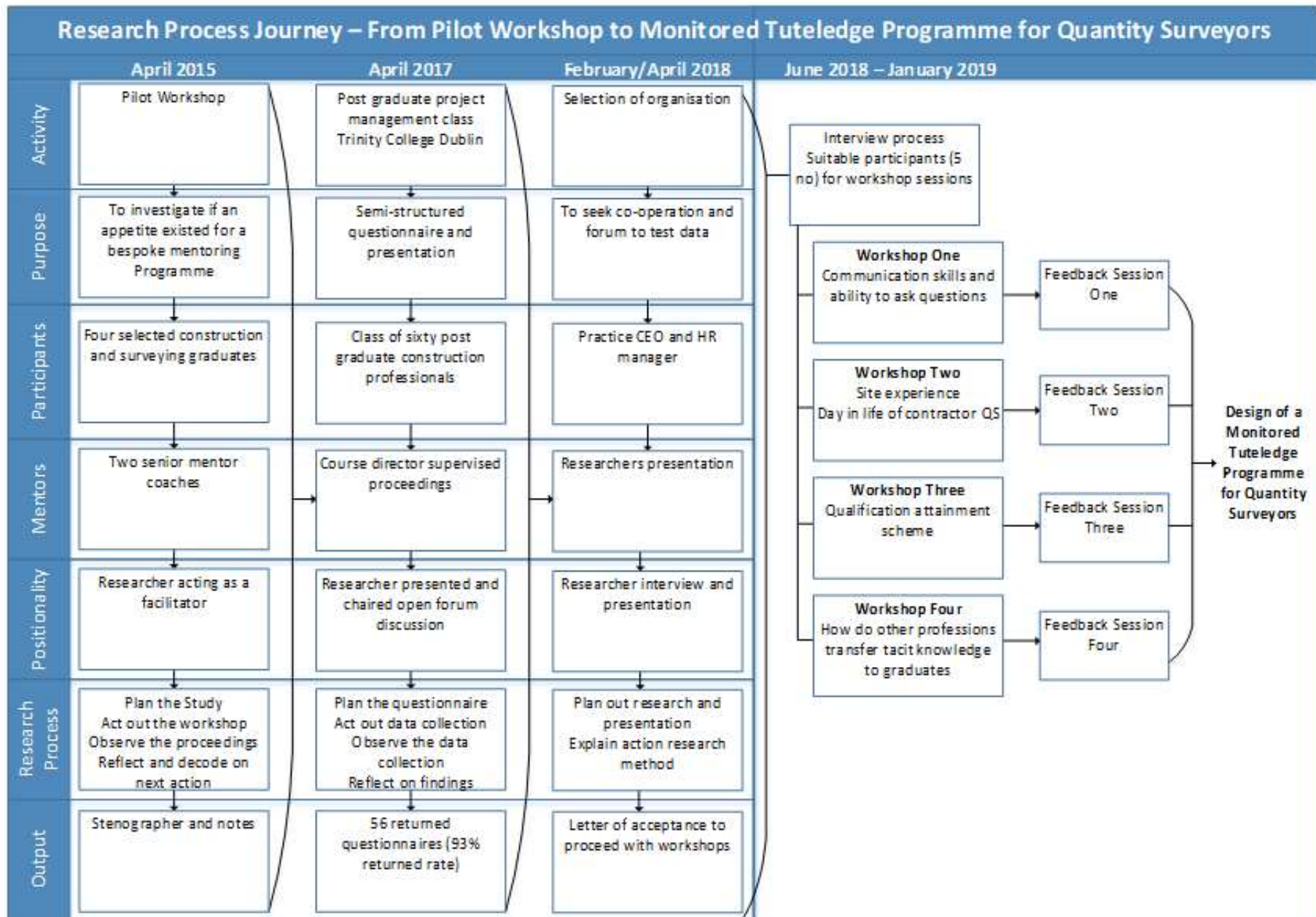


Figure 5.2 Research Journey MTP (Boylan, 2019)

The MTP process was cyclical and sustainable. A key feature of this method and the process by which it was managed and delivered was that it would be capable of a theoretically infinite series of iterations. This would allow the transfer of tacit knowledge to *evolve* over time. The process could thus automatically include changes in the tacit knowledge that was transferred. In this way, firms could maintain competitiveness and mentees would be able to keep their tacit knowledge current.

Given that the process chosen was a cyclical one, the choice of an Action Research methodology became almost obvious. The Action Research cycle of *plan, act, observe* and *reflect* lends itself perfectly to this scenario. The observations and reflections of each cycle can feed into the design of the next one.

The complete research journey is illustrated in Figure 5.2.

A limitation of the Action Research process is that it does not (and cannot) produce quantitative results of the type produced in some other kinds of business-oriented research such as surveys and case studies. However, as was indicated in the literature review, Action Research is appropriate in a business or organisational setting where the object of the exercise is to increase organisational efficiency in some way without coming to firm conclusions that are widely generalizable. This limitation is recognized and, it is hoped, has been addressed by being able to come to the conclusions detailed in Chapter 6.

5.2 Discussion of MTP design from various perspectives

The stakeholders in a mentoring programme were discussed in Chapter 2. The structuring of the MTP was based on elements of the Calixto model (See Table 2.9). As already mentioned, the emergence of the eventual MTP constituents evolved as a result of the mentoring workshops and feedback sessions as shown in Figure 5.2. This chart represents the research journey from pilot workshop to final MTP design over a four-year period. Its purpose is to show in one succinct picture, the various stages of research that were required to finally reach the design process.

Research commenced with the pilot workshop as a testing ground to investigate the appetite within a postgraduate group of young, qualified construction professionals for such a mentoring workshop. This activity also afforded the opportunity to both professional and experienced mentors to see how useful such a programme would be and if it would benefit them.

The second research stage involved the administration of structured questionnaire to a class of 60 postgraduate construction professionals. Its purpose was to analyse and ascertain any gaps in their

previous training. The highlight of this forum was the open discussion at the end of the questionnaire session. This afforded the class the opportunity to speak openly and frankly about their concerns for such issues such as succession planning, ageism and loss of key knowledge personnel in the organisations in which they worked. The function of the first and second stage of the research process mentioned above was to design the format of the eventual method for the transfer of tacit knowledge to quantity surveyors. It could be compared to the design and building of the apparatus required to perform a science experiment.

Finally, armed with the analyses of knowledge gaps, the research moved to selection of a host company or QS practice to hold Action Research workshops. The purpose of these workshops was to trial the MTP in a working environment. This was supported by the host company management and HR department. This entire process spanned a four-year period and produced a large quantity of data and information pertaining to the establishment of a bespoke MTP. The host practice is a very busy and versatile practice employing over one thousand quantity surveyors both nationally and internationally. Senior management were very supportive of the research and expressed concern about their ability to meet the projected levels of resources required to address succession planning and how their organisation could recognise how and when critical knowledge could be tapped into before it departed for a competitor.

5.2.1 Organisational perspective

The organisation in this research is a multi-disciplinary construction cost consultancy organisation. It operates in a competitive market in several countries with a large pool of employees. It has continuous 'health checks' and a hierarchical management structure. There are separate teams and sub-teams to control the costs on multiple projects. but the organisation is geared to deliver high end projects. It requires its professionals to be proactive, have the ability to meet strict deadlines and be able to display quick-turnaround performance for clients.

Hence, the organisation requires its professional workforce manpower to grow quickly in confidence and ability to perform.

The common theme through the four feedback sessions, which were held after the workshops was that the professionals were under constant workload pressure, and family and social life was undermined. They had an energy and a hunger for knowledge that would better equip them for their projects and career. The organisation's supervisors and senior management are in the same predicament and welcome any or all external support that would hone the skills of their workforce

and contribute towards a sustainable knowledge base. The organisation was willing to finance group or individual mentoring but would require input into the programme content and design.

5.2.2 Employee perspective

The employee status was mostly young professionals, committed to their careers and employer but who were working in a stressful environment. By the very nature of the construction industry they experience constant technical and economic change. The employees need be equipped to meet this requirement for change. All the workshop participants, including the extended session with the SCSi in workshop three displayed an enthusiastic desire for support and assistance to receive this tacit knowledge. The researcher had the privilege of experiencing the respect and interest for each workshop. Respect and interest were higher at the feedback sessions where the employee participants could speak in a more relaxed and confidential forum about their career concerns and desires. All said that they would welcome a bespoke MTP, with their early involvement in compilation of the programme. They also expressed a desire for a work-life balance. Participants said that the organisation must realise that sufficient study and research time is a priority for all aspects of the programme.

5.2.3 Professional institution perspective

The SCSi are the supporting body for CPD and training. Its members have more goals than the achievement of chartered status via the APC process. While the APC Final Assessment is a momentous key part of a surveyor's career path, the learning and training must continue for all parties involved. The mandatory CPD commitment may not be sufficient to maintain a high level of professional competence for its members. It might be appropriate for the SCSi to consider awarding CPD points for approved internal workshops.

5.3 Addressing the research question

The third part of the research question set out in Chapter 3 was 'can the transfer of tacit knowledge be done as an effective and worthwhile process?'

The literature in Chapter 2 identified models such as the SECI and *Ba* models for transforming explicit to tacit knowledge and tacit to explicit knowledge. Both concepts originated in Japan in the 1980s and 1990s and are interchangeable. The researcher's experience and findings found that both models were a good starting point but the individuality of each workshop mentor and mentee did not allow for such a simple transformation.

In the researcher's opinion the most obvious finding came by way of a compliment at the concluding session after the fourth workshop. The HR Manager thanked the researcher for instigating and generating a 'learning culture' within their organisation. In the context of the literature reviewed there were several examples of communities of practice, instructional scaffolding, situated learning and Humble Inquiry. None of these models succinctly answered the training needs of the chosen group of mentees. The final research outcome resulted from an amalgam of all models.

The enthusiasm shown by the peer group during the four workshops was positive for the research process because the willingness to learn new information and clarify existing knowledge was an encouragement for all in attendance. The three activities listed strongly indicated that the peer group found the process beneficial. The indication was reinforced by the peer group's continuation with the same framework for new knowledge acquisition.

Elements of the research findings such as communities of practice, situated learning and Humble Inquiry corroborated the information found in the literature review. The process had to undergo a degree of tailoring to suit a bespoke mentoring process. The process was designed with the assistance of the peer group and expanded to suit future use by both the group and the organisation.

Key findings from the MTP process were:

1. MTP participants welcomed a structured in-house mentoring programme but only on condition that they could influence the selection of mentor and topic.
2. MTP participants were more at ease with agreement that comments and discussions following each presentation remained confidential.
3. MTP participants embraced change and expressed willingness to explore further knowledge transfer topics.
4. HR management noted that all MTP participants expressed interest in future leadership roles within the organisation.
5. Following the second workshop which focused on how contractor surveyors operate MTP, participants noted that the mindset of site-based contractor quantity surveyors was radically different from their training to date.
6. Following the third workshop presentation by the SCSI education director, the MTP participants voiced their opinions on how the APC process to achieve chartered status could be restructured. This workshop proved to be the most popular and relied heavily upon the

tacit knowledge and experience included in the education director's view of why some candidates may fail the APC.

7. HR and management decided after the four workshops to review their induction, onboarding and exit interview process.
8. The final workshop was based on how chartered engineers dealt with the mentoring of their graduates was, in the researcher's opinion the lowlight of the entire process. Concluding the participants opined 'quantity surveyors and the SCSI do it better!'
9. HR and management pointed out that the identification of knowledge gaps in the training of a QS led to a discussion at board level on the need to consider a framework for succession planning.

The author's observations on the question "If I had to carry out the four workshops again what would I have done differently?" included the following:

1. Following workshop one, the participants would have preferred more time with the communication and media experts on a one-to-one basis.
2. Following workshop two, with the site-based construction surveyor, one participant expressed disappointment with the content as he had worked for several years as a site-based QS and found the content rudimentary. The other participants were not in agreement and appeared to gain an insight into the roles and responsibilities of a site-based QS. A site visit with the contractor QS might have been more beneficial.
3. The larger workshop, number 3, with the SCSI Education Director proved very popular. The workshop might have worked better at a larger venue.
4. The final workshop with an Engineers Ireland mentor could have been replaced by either a legal or medical professional mentor. The literature review of the range of professions and how they mentor their professionals perhaps would have been a better starting point for mentor selection for workshop four.

5.4 Discussion on how aims and objectives were addressed

Chapter 1 (Section 1.2) set out the aim and objectives of the thesis. These are repeated below to aid the flow of the narrative.

The aim was to develop a coaching and mentoring programme for graduate quantity surveyors to enhance tacit knowledge transfer from experienced professionals.

The first objective was ‘to review, evaluate and synthesise the literature on tacit knowledge creation, management and transfer for graduate quantity surveyors’

The second objective was ‘to analyse training techniques for graduate quantity surveyors’

The third objective was ‘to investigate possible strategies for knowledge retention, transfer and succession planning through a monitored tutelage programme, using an Action Research methodology.

The fourth objective was ‘to evaluate from the data generated and collected for the research, the positive and negative aspects of a monitored tutelage programme for graduate quantity surveyors using experienced professionals as tutors.’

The fifth objective was ‘To analyse and appraise the potential restrictions and enabling factors of implementing a bespoke mentoring system’.

5.4.1 How the aim and objectives were addressed

The aim was addressed by formulating a coherent, evidence-based research structure. The first part of the development was establishing what was likely to be a suitable transfer mechanism for the tacit knowledge. The conclusion of the first part of the research concluded that a suitable transfer mechanism was likely to be a cyclical mentored tutelage programme structured on the basis of ‘plan, act, observe and reflect’. The second part of the development was the investigation and analysis of the chosen transfer process using Action Research. This was designed to investigate whether or not the MTP succeeded in the transfer of tacit knowledge and whether all the stakeholders in the process found it effective to the point of continuing with this system.

The objectives or ‘steps along the way’ were set out as the route to achieving the aim.

The evidence base for the first part of the process, the design and delivery of a system for the transfer of tacit knowledge to graduate quantity surveyors was established by the achievement of the first and second objectives. The review and analysis of published literature on the theory and practice of knowledge transfer provided the basis for the discussion group and survey. The literature review provided the source of evidence based on ‘secondary data’ and the discussion group and survey provided ‘primary data’.

The conclusions from the analysis of the secondary data from the literature review and the primary data from the discussion group and survey provided a theoretical basis and empirical results that led to the choice of a mentored tutelage programme. The conclusions were by no means definitive.

The literature review showed that there were many theories about tacit knowledge and its generation, transfer and management and also many examples of ways of doing this. The hypothesis resulting from the literature review and the results of the group discussion and survey was that a mentored tutelage programme would be worth investigating. It was also determined that its chances of being successful were likely to be greater if certain conditions were met. These conditions were that the organisation in which the sessions would be held would need to have a culture of openness and trust and a questioning ethos.

A further source of evidence towards the design of a mechanism for the transfer of tacit knowledge was the professional experience and knowledge of the author. This thesis was conducted as a Professional Doctorate in which the professional knowledge and experience of the author is considered to be a key part.

Once a monitored tutelage programme had been chosen as the method for tacit knowledge transfer, the third objective, the strategies for implementing it were informed by the results following the achievements of the first and second objectives. The strategy chosen was a cyclical iteration of workshops on a variety of topics identified by the participants.

The fourth objective of 'evaluation of the positive and negative aspects of the MTP' was facilitated by the decision to use an Action Research methodology. The 'observation' and 'reflection' parts in the methodology provided automatic feedback on positive and negative aspects. Some positive and negative aspects also became apparent at the earlier 'design' (objectives one and two) stages of the research process. These included the willingness and availability of experienced professionals to act as mentors, the cost of providing mentors as measured by the opportunity cost of the mentors being diverted from immediate revenue earning work and the difficulties faced by recent graduates as a result of lack of time. This was due to 'pressure of work' and family commitments. It is not the point of this discussion to re-visit the results part of this thesis but to discuss them in relation to the achievement of the aims and objectives of the research.

The fifth objective of the analysis of potential restrictions and enabling factors for MTP was also made easier by the choice of an Action Research methodology for the analysis of the operation of the MTP. A key point following from the analysis of restrictions and enabling factors is that these factors can be addressed following the discussion and reflection phases. This allows the transfer of tacit knowledge to evolve through time adding an evolutionary dimension to the transfer process.

The literature review, research findings and discussion chapter have highlighted the difference between coaching and mentoring. The final choice of mentors for each of the four workshops showed that the resultant solution was an amalgam of both mentoring and coaching. A bespoke MTP was achieved in conjunction with the mentors, mentees and the organisation's management. The programme was developed with input from all stakeholders. Review or breakout sessions were held to embrace change and work with the mentees but at the same time holding the MTP structure in place. The intermediate breakout sessions held in between each Action Research workshop afforded the candidates the opportunity to speak in confidence about their training and how to address frustrations without fear of recrimination from their peers or employer. The findings have shown that the MTP was well received. Its success was further substantiated by the organisation implementing a programme of continuous workshops with their quantity surveying staff.

To create a sustainable knowledge transfer programme took several years to reach fruition. The process journeyed through several research stages as outlined in Fig. 1.1 Structure and logic of the research process. This shows how the process emanated from inception of this research.

The emergent MTP, using the *plan, act, observe and reflection* tools of Action Research is depicted in Fig. 5.1. The literature that supported the design and implementation of the trial MTP was analysed and discussed in Chapter 2. The next and final chapter summarises the research outcomes and the beneficiaries to the programme.

5.5 Conclusion

The discussion and findings considered above all feed into what can be considered the contributions to knowledge from the design and implementation of an MTP for graduate Quantity Surveyors. They provided the basis for the design of a process for the transfer of tacit knowledge. This process was found to be effective and efficient. It was also found to be dynamic in nature as it allowed for continuous action learning by both mentors and mentees. It captured the evolving nature of tacit knowledge in professions involving knowledge workers. In this way the economic sustainability of knowledge-based organisations is enhanced.

This chapter has analysed and discussed the various gaps in the training of graduates and professionals and how this knowledge could be addressed by utilising a knowledge retention programme such as an MTP. The identified gaps were discussed to show how the MTP could address the knowledge disparity to ensure continuance and retention of critical knowledge.

The stakeholders in the programme were identified and the ownership of the programme was highlighted. The structure, knowledge vulnerabilities and implementation methods for a bespoke quantity surveying knowledge retention programme have been set out and discussed. Alternative designs and frameworks for compiling and implementing a knowledge retention programme were discussed for consideration by individuals and organisations.

CHAPTER 6

CONCLUSION

6.1 Introduction

This chapter draws conclusions from the research in this thesis and highlights the key contributions to knowledge. It also discusses the limitation of the research, suggests some further research and indicates its potential benefits. Figure 6.1 highlights the research outcomes. Several flowcharts and diagrams were included in earlier chapters to describe the research journey. To assist the reader and by way of clarification Figure 5.1 provides a summary flowchart of the complete research process.

The nature of tacit knowledge creation and transfer underlie the choice of an Action Research philosophy. Because tacit knowledge can be very difficult or impossible to convert into explicit knowledge, the Action Research cycle of *plan, act, observe and reflect* was proposed as a useful way of investigating its transfer. The development of the monitored tutelage programme can be viewed as the construction of the apparatus required for Action Research on the transfer of tacit knowledge. It was hypothesised that a monitored tutelage programme which continued on a cyclical basis would ensure that the body of tacit knowledge was not just transferred but could *evolve*. This was because the MTP used the experience of the mentor, coupled with the feedback of the participants. The idea was that it could evolve with each session of the monitored tutelage programme. The difficulty of pinning down tacit knowledge means that its transfer can be aided by a feedback mechanism. This helps to ensure that what was meant to be transferred has been transferred and that what is transferred is relevant to a particular situation, task or profession. In this case the ‘particular profession’ is quantity surveying and the ‘particular situation’ is the construction industry.

The construction industry in Ireland is a significant and strategic element of the economy. This is the same as in most developed economies. The construction industry is cyclical and experiences new economic challenges on a continuous basis. A qualified, competent and professional Quantity Surveyor’s role is inherent to the success of this industry. Research in this thesis demonstrated that tacit training and the transfer of tacit knowledge have not been identified or researched as a crucial element of competency training for a Quantity Surveyor. There is a dearth of tested research on tacit knowledge transfer specifically for Quantity Surveyors. This thesis endeavours to address and correct this knowledge gap.

6.2 Achievements of the aim and objectives

6.2.1 Aim

The aim of this doctoral research was to develop a coaching and mentoring programme for graduate Quantity Surveyors to enhance tacit knowledge transfer from experienced professionals.

From the research results and discussion set out in Chapter 5 it can be concluded that this aim has been achieved. In order for the aim to have been achieved the objectives, or ‘steps along the way’ also had to have been achieved.

A major aim of this research was that the results of the research could lead to the development of a coaching and mentoring programme for graduate Quantity Surveyors. This programme would, as a result of the research, contain the activities required to enhance the transfer of tacit knowledge to the graduates from experienced professionals.

Chapter 5 identified the stakeholders of the knowledge transfer programme, the owners of the programme within the organisation and knowledge vulnerabilities and gaps. It then discussed the design and implementation of a knowledge transfer programme in a monitored structure. There are several examples of how the ultimate monitored tutelage programme can be custom designed for each organisation and how such a programme can be implemented, monitored, measured, scored and retained in a cyclical fashion. Figure 5.1 showed the research journey from inception through to final design of an MTP.

The difference between a traditional mentoring session or programme and an MTP is that the end user or participant has the opportunity to choose both the topic to be monitored and, in conjunction with management, may also agree the choice of mentor. In addition, the participant can request a signed confidentiality agreement between the mentor and mentee. Participants can also have the opportunity to request repeat mentoring in order to ensure sufficient knowledge transfer has occurred. This may be carried out in conjunction with the SCSI for both CPD points and preparation, if required for APC support and the achievement of ‘chartered’ status for the Quantity Surveyor.

6.2.2 Objectives

The objectives are set out below with a brief comment, written as a conclusion, relating to each of them.

The first objective was to review, evaluate and synthesise the literature on tacit knowledge creation, management and transfer for graduate Quantity Surveyors. This was accomplished and has already

been discussed at length and it may be concluded that the first objective was achieved. Conclusions are as detailed below.

6.2.3 Conclusions from the Literature Synthesis and Review

The literature synthesis and review *is considered as part of the research* as it allows conclusions to be drawn in relation to the research questions. These conclusions relate to aspects of relevant theory and empirical results published by other authors. The conclusions drawn from the first part of the review in relation to the question ‘Is there a gap in current knowledge and literature about knowledge transfer for graduate Quantity Surveyors?’ are below.

First, the review of the literature indicated that the concepts of ‘tacit knowledge’ and ‘knowledge transfer’ have a long history going back as far as the ancient Greek philosophers Aristotle and Plato and, in later times, Locke (1689) and Kant (1781). The recent body of knowledge on this topic began around the turn of the 19th century with the work of Dewey (1910) and (1938). Seminal ideas on the nature of tacit knowledge derive from the work of Polanyi (1958, 1962, 1966 and 1969). The nature of tacit knowledge transfer has also been widely theorized about and investigated. However, it was concluded from the review of the available literature on the nature and practice of tacit knowledge transfer, that there was indeed a gap in current knowledge about the transfer of tacit knowledge for graduate Quantity Surveyors. The nature of tacit knowledge and its transfer in other professions such military, legal and medical had been studied to varying degrees. The transfer of tacit knowledge in the quantity surveying profession had not been studied in the same way.

The literature synthesis and review not only addressed the direct question “Is there a gap in current knowledge and literature about knowledge transfer for graduate Quantity Surveyors?” but also provided a theoretical basis and some practical examples on which to base the design and delivery of such a process. The review did not show that methods similar to a monitored tutelage programme for Quantity Surveyors had been developed. The existing traditional mentoring methods for this profession had been one-off training programmes. These were organised to meet specific industry requirements or were used to introduce new or innovative technologies.

Monitored tutelage programmes for the transfer of tacit knowledge had not been tried in the case of Quantity Surveyors. It is possible therefore to conclude that a gap in the literature has been demonstrated. Also, that training techniques for Quantity Surveyors after graduation from a university or equivalent institution, were mainly one-off for specific techniques or problems. None

involved the formal transfer of tacit knowledge or knowledge retention. They may have included these features but were not designed specifically for them.

The second of the five objectives in this thesis was to analyse training techniques for graduate Quantity Surveyors. There is little in the literature relating specifically to Quantity Surveyors, except Murphy (2011). But there were many publications relating to the transfer of knowledge in other professions. The wide variety of material in the review provided a good basis for judging the appropriateness and relevance of techniques for knowledge transfer, especially for knowledge workers such as Quantity Surveyors. The literature review showed that the training techniques for Quantity Surveyors depended on the level of educational attainment. Before graduation at honours degree level, the training was mostly by the transfer of explicit knowledge by lectures, reading and practical exercises. After graduation, training was generally done by the organisation for which the graduate worked. If the graduate wished to obtain chartered status, the route to becoming a Chartered Surveyor incorporated training in defined areas plus the transfer of tacit knowledge by working in a suitable firm. The route to becoming chartered did not include the transfer of tacit knowledge in a formal mentoring programme.

The abundance of studies and the lack of information specific to Quantity Surveyors led to the need to decide on a methodology suitable for the development and conduct of a way of transferring tacit knowledge that was suitable for them. The literature review and synthesis allowed the comparison of a variety of different methods including Action Research and action learning. The review of tacit knowledge transfer in the workplace and amongst workers in a specific organisation or profession led to the further consideration of Action Research and action learning. Both these techniques are facets of the same idea, *i.e.*, that ‘action’ in the learning process is more efficient and effective than being passive. For example, the literature review cited Raelin and Coghlan (2006) who indicated that after five days less than five per cent of learners remembered less than a tenth of what they had learned during a lecture. When activities were used that involved seeing and hearing, retention increased to 20 per cent. However, when learners learned from doing, they retained 60 to 70 per cent of what they practiced.

The second objective was to analyse training techniques for graduate Quantity Surveyors. This was accomplished and has already been discussed at length in Chapters 2, 3 and 4 and it may be concluded that the second objective was achieved. Figure 6.1 highlights the beneficiaries of this research process which includes both professional practice Quantity Surveyor and the general contracting Quantity Surveyor.

6.3 Outcomes for the Professional Practice Quantity Surveyor

It has been established that quantity surveying professional practices tend to have a focused and unified approach to graduate training, up to and including the assessment of professional competence. There are examples of Quantity Surveyors at various career levels who have chosen not to progress to chartered level with the various professional institutes. The lack of chartered status does not necessarily make a surveyor less competent than one who is 'chartered'. It has become apparent that most employees of surveying practices may be 'unchartered' due to personal choice. A knowledge transfer programme could provide two explicit ways in which the knowledge and skills of these industry participants could be used and recognised. First, it would allow their life-earned tacit knowledge to be tapped into and transferred to willing graduates and industry peers. These graduates and industry peers need not be in the same organisation as the experienced professional. It may also encourage them to get more involved than previously in the transfer of tacit knowledge. Research has shown that the medium and larger sized surveying practices may have a number of graduates simultaneously preparing for APC qualification. Some practices have offered salary and bonus inducements to encourage candidates to achieve chartered status with the professional institutions.

Knowledge retention transfer programmes as discussed in the previous chapter have not been designed to compete with the professional institute's (the SCSI/RICS) APC process. The MTP is a support mechanism for participants. More importantly, it may stimulate an organisation to address the potential loss of knowledge and skill that would occur as a result of critical knowledge professionals quitting the practice to work for another or retiring.

When professional practices are tendering for work - both private and public - the selection process usually applies a weighting to the possession of relevant experience in specific areas. Examples of specialist experience may include projects such as data storage projects, high-tech fit out projects, public buildings such as libraries, civic centres, specialist renovation and refurbishment work. In the case of the criteria for selecting a surveying firm or practice, proof of relevant experience and capability will depend on the organisation's ability to display the necessary competences and experience. A monitored knowledge transfer and retention programme would ensure that the organisation has a sustainable process to retain this knowledge and capability and to ensure competitive market advantage.

6.4 Outcomes for the General Contracting Quantity Surveyor

Depending on the size of the department within the construction firm, the construction quantity surveying firm may have a tiered structure of candidates preparing for APC. This would be similar to a professional practice. For a surveyor working for a contractor the competencies required may have a different commercial focus from that of a surveyor working in a professional practice. The APC competencies, as outlined in Chapters 2 and 4, are more related to professional practice than construction firm disciplines. It can be argued that this creates a significant disadvantage for a candidate sitting the APC who has no knowledge of working for a professional practice. There are competency similarities in both types of firm in relation to measurement, compilation of bills of quantities and the level of negotiation ability. Competencies such as estimation, compilation of claims and recording project delays on site are generally specific to contractor surveyors.

The introduction of a knowledge transfer programme for a construction firm would support the retention of experienced and skilled staff. The specific competencies required for a contractor such as bid preparation, marketing knowledge, dealing with sub-contractors on a daily basis, site attendance

The third objective was: Using Action Research methodology, to investigate possible strategies for knowledge retention, transfer and succession planning through a monitored tutelage programme. By a series of carefully considered steps from the literature review, to an initial discussion, to a survey of possible participants in the transfer process, a strategy was determined. The strategy was eventually carried out and investigated using an Action Research methodology. In this way it is possible to conclude that the third objective (or step along the way), was achieved

6.5 Conclusions about the Research Methods

On the basis of what had been reviewed, a monitored tutelage programme (MTP) was decided as the method of tacit knowledge transfer.

Chapter 3 explained why an Action Research methodology was chosen. The *plan, act, observe and reflect* cycle was used as the basis of the programme design. This iterative MTP will never reach a termination point. It is a continuous learning process. The proposition was that participants would move easily from the training workshop to the next cycle. They would glean new knowledge at each stage under the supervision of an experienced mentor. This methodology provided a workshop framework with a cyclical direction from initial planning to reflection. It allowed all participants to have an input and achieve supervised direction to address their training gaps and vulnerabilities. Academic and professional advice at the outset of this research suggested a case

study approach might be more in keeping with traditional research. It was also suggested that the mentoring workshops could have been multiple case studies. This suggestion was repeated at the Internal Evaluation stage of the thesis. The researcher defends the choice of Action Research as a methodology largely because the application of ‘plan, act, observe and reflect’ would have been required for each element of the research regardless of the methodology chosen. It was for this reason that other methodologies were not used. The eventual MTP incorporates all the essential ingredients of Action Research as defined by Coghlan and Brannick (2014).

The third objective of the thesis was to use Action Research methodology to investigate possible strategies for knowledge retention, transfer and succession planning through a monitored tutelage programme. This objective was attained by using the research approach suggested by Trafford and Leshem (2008) of starting at the ‘end’ *i.e.*, the monitored tutelage programme for the transfer of tacit knowledge and working back to the ‘beginning’.

Incorporated in the approach was the notion of a ‘community of practice’ such as that outlined by Brown and Duguid (1998), as the research was done with a group of graduate Quantity Surveyors. The idea of mentors was also based on this idea as the mentors were also experienced in this field.

To summarise, the problem was the construction and delivery of a tacit knowledge transfer programme; the approach was that of Trafford and Leshem (2008) and the research method used to address the problem was Action Research.

At the heart of this thesis is the idea of researching the creation, management, and transfer of tacit knowledge. The research process itself was composed of two major steps. The first was the design of a method for the transfer of tacit knowledge which included the review and synthesis of the literature about the theoretical and empirical elements of the transfer of tacit knowledge. The second step was to research the transfer by using an Action Research methodology thus investigating the transfer process (MTP).

The fourth objective was: To evaluate from the data generated and collected for the research, the positive and negative aspects of a monitored tutelage programme for graduate Quantity Surveyors that used experienced professionals as ‘tutors’, (or more strictly ‘mentors’). The positive and negative aspects of a monitored tutelage programme were not tabulated, specifically in the thesis. However, they were discussed at length, weighed and eventually used to decide on the form of the monitored tutelage programme. Similar to objective 2 the research outcomes and beneficiaries outlined are proof that this was achieved. In this sense it can be concluded that the fourth set of objectives were achieved.

6.6 Research Outcomes and Beneficiaries

The research outcomes and potential beneficiaries are detailed in Figure 6.1. The potential stakeholders who benefit from this research include:

- The quantity surveying practice. As discussed in Chapter 1 of this thesis this organisational entity could also be the quantity surveying department in a construction and engineering firm.
- The MTP workshop participants. They would have a vested interest in assisting with the design and structure of each workshop which can be repeated cyclically until all stakeholders are satisfied that transfer of tacit knowledge has occurred.
- The professional institutions such as the SCSi or the RICS.
- The third level colleges and educational facilities.
- Human resources management in the larger practices and organisations.
- Workshop mentors who are paid a professional fee for their contribution.
- Career experts and specialist employment agencies dealing with construction specialists such as Quantity Surveyors.

and experience are not nearly as commonly required by a surveyor in a professional practice.

The cost of training-in a new employee may be significant for any organisation. The opportunity cost of the supervisory time that could otherwise be spent on activities giving a better short-term return is seldom considered. These costs may be substantial. Organisations should ensure that inducements for the retention of staff with knowledge critical to their success should include a condition that their highly valued knowledge is shared with peers and juniors. This would establish a degree of knowledge sustainability for the organisation.

The research outcomes depicted in Figure 6.1 highlight the potential beneficiaries from the work done for this doctoral thesis.

Research Outcomes							
Potential Beneficiaries from this Doctoral Thesis Research							
Who	Quantity Surveying Practice (Host Practice)	Workshops and Practice Participants	Professional Institutions SCSl and RICS	Academic Third Level Colleges	Human Resources and Practice Senior Management	Workshop Mentors and Subject Matter Experts	Career Experts and Employment Agencies
How	The host practice can become a tacit knowledge enabling entity. Tacit knowledge transfer can now be promoted as a key ingredient for their practice.	Further encouragement to participate in future MTP. Participants and HR agree choice of mentors that would greatly enhance and address knowledge training gaps. Cyclical workshops agreed in advance to address tacit knowledge concerns	Institutions such as SCSl or RICS have a need for industry feedback to assist their function and practice. SCSl and RICS always welcome constructive and useful feedback from their members.	Third level colleges rely on industry feedback to address professional practice changes. This results in curriculum updates and changes. Relevancy of topics included in course curriculum.	The host practice for the MTP workshops greatly appreciated feedback for their practice. They need to retain key knowledge enablers. Forums such as MTP can provide open discussion and participation in change.	To counter ageism in the construction industry MTP mentoring provides employment and recognition of Tacit Knowledge Transfer as a valuable mentoring and training tool	To prevent career change or address natural attrition by QS implementation of MTP may save valuable time and expense in training.
Future	Structured mentoring programmes such as MTP occurring on a regular basis Invited mentors such as Subject Matter Experts becoming aligned with the host practice.	Further MTP arranged as proof of Tacit Knowledge Transfer required.	CPD points for participation in MTP workshops.	SCSl to meet college representatives to discuss areas of change such as BIM, contractual and measurement changes.	Further MTP arranged as proof of Tacit Knowledge Transfer required.	Further MTP arranged as proof of Tacit Knowledge Transfer required.	Engagement with such experts by institutions such as SCSl or RICS.

Figure 6.1 Research Outcomes (Boylan, 2019)

Beneficiaries include the quantity surveying practice which assisted and hosted the MTP workshops, the workshop participants, the professional institutions, human resources professionals and senior management of the host practice, workshop mentors, career specialists and employment agencies. The host practice, management and workshop participants developed an understanding, as a result of the MTP workshops, that resulted in the practice incorporating tacit knowledge transfer as a key ingredient of its corporate development. As knowledge-enablers the practice now encourages questioning of normal practice and procedures. On a number of occasions this questioning ethos has resulted in further MTP workshops with subject matter experts and mentors. The mentors have recognised this process as an additional potential earning opportunity plus the satisfaction of assisting in the transfer of tacit knowledge.

The professional institutions and third level educational facilities have now forged a stronger link to investigate areas of the college curriculum which may require updating and change to stay in tune with market requirements. Employment experts such as employment agencies can now see that candidates preparing for job interviews have improved their ability to answer questions about many areas of tacit knowledge. Previously, supporting evidence that the candidates would possess such tacit knowledge was not a prerequisite.

The fifth objective was: To analyse and appraise the potential restrictions and enabling factors of implementing a bespoke mentoring system. This objective was wide ranging. The series of bespoke monitored tutelage iterations that was finally delivered and analysed satisfied the aim of the thesis because a monitored tutelage programme for the transfer of tacit knowledge was developed, delivered and researched using an Action Research methodology. The enabling factors were explored at length in the literature and the subsequent research using a discussion group, and a survey. It became clear that enabling factors included but were not confined to: the identification of a community of practice, recognition of the need to transfer tacit knowledge and the need for the development of a questioning ethos in an atmosphere of mutual trust between mentors and mentees. The restrictions, aside from a lack of the enabling factors just mentioned, included lack of resources. This included a lack of time for mentoring on the part of experienced professionals. The cost to these individuals and also to the organisation could easily provide a constraint. The solution proposed was to formally include provision for the transfer of tacit knowledge in the management of an organisation. It emerged that this would be easier in a large organisation than a small one. A way around this size constraint was to have MTP organised by the surveyors' professional body (SCSI/RICS).

6.7 Limitations of Study

Like all research, this study has its limitations. Some of these are stated below.

Research Sample: The research instrument chosen was a structured questionnaire targeted at postgraduate project management students. The broad mix of professionals included Quantity Surveyors. This could be viewed as a limitation as the sample was broader than Quantity Surveyors. A class of mixed professionals was chosen as it allowed the members of the multi-discipline forum to air their view on career training deficits. It is planned to extend the MTP to other professions in the future.

Research Design: The chosen qualitative Action Research methodology has a degree of flexibility and interpretation. The MTP workshops could perhaps have been aligned more rigorously with ‘plan, act, observe and reflect’ iterative cycles.

Research Bias: There was always the risk that the researcher, as a mature Quantity Surveyor, could display bias towards the willingness that all participants had and a similar passion for new knowledge and learning. No research is completely free of bias and usually the most that one can do is recognise its presence and take it into account where possible.

6.8 Further Research

This research to date has been welcomed by SCSi, endorsed by SCSi’s Education Director and a major cost consultancy firm operating in Dublin and internationally. It is hoped that this MTP will evolve when tested to other professions in the future. The highlight of this endorsement was that, on completion of the four workshops, the host organisation continued to hold regular MTP sessions. The host organisation recognises that a culture of learning now exists with its senior management in formulating a programme for succession planning.

Disparate concepts were employed to analyse and investigate a conventional issue such as mentoring to professionals in order to create a fresh understanding of existing methods. The resultant MTP is worthy of further investigation for other professions such as engineering, legal or finance.

The research proved to be time consuming, as the experience of working with a very busy and successful cost management practice had all the related disadvantages of finding suitable

workshop times for the mentors, HR personnel and the five candidates. The bespoke design of the MTP allowed flexibility for all parties leading to a workable programme as reported back by the participants.

The research was multidisciplinary both in terms of the variety of mentors and their professions and with the politics of dealing with a large international organisation. There were many approaches to obtaining opinions and changing work methods.

There is no formal agreement in Ireland for the training and education of Quantity Surveyors which incorporates all the stakeholders from secondary school level, through the college process and concluding with satisfactory employment. The SCSI carry out regular visits to secondary schools and present to final year students informing them of what a career in quantity surveying involves in terms of study and educational commitment. The researcher has represented the SCSI at such functions. Such forums are an excellent conduit; however, limited resources and time make it difficult to deliver a meaningful and effective presentation. A brief presentation necessarily gives only a snapshot of what quantity surveying is about. A more comprehensive approach may require engagement with career guidance staff in advance of any presentation. These may be well placed to find out before a presentation which students have expressed an interest in a career in construction and associated professions. In Chapter 4 the question was raised of what motivated the participants to pursue a career in the construction industry. The lowest percentage of what motivated those surveyed was that experienced in school (4 to 8%). This highlights the need for organisations such as the SCSI to further investigate how this low level of motivation as a result of school experience can be addressed.

A more effective way to present to secondary school students might be to request an analysis from the school's guidance counsellor of who has expressed an interest in quantity surveying, the seriousness of the expression of interest, whether they have relatives working in the construction industry and have they chosen subjects in their year that would be compatible with construction. This information would provide the SCSI with a framework for a better and more focussed presentation. The goal is to find the most interested students and to forge a link via future invitations to the SCSI offices and lectures. This would potentially save career time for both employers and students.

6.9 Future Research Recommendations

The first stage of data collection and analysis used information from the questionnaire in phase two of data collection. The next stage was to test the transfer knowledge programme using the

dynamics of Action Research methodology. The candidates and organisation were selected and agreed to participate in an MTP. The researcher, acting as a facilitator, met the candidates individually to assess their opinion on tacit knowledge gaps, examined and summarised the group's demographics in relation to experience, devised the programme content, held the various workshops using trained mentors and coaches, and reflected on the success or failure of each workshop in advance of either moving onto the next programme cycle or discontinuing the process.

Published articles in trade and professional periodicals such as the SCSJ Journal and Public Procurement Magazine may inspire further research by Quantity Surveyors. The author intends continuing to introduce tacit knowledge transfer perspectives as part of annual lecture sessions in TCD and participation in the annual Action Research Colloquium at UCD.

Perhaps for further research, the process could be supported by the SCSJ as part of the APC process where individual MTP workshops could identify weaknesses or gaps in the candidate's knowledge before completing the APC journey. This further research may then be transferred to other professional societies and institutions.

Another area of concern for senior Quantity Surveyors may be ageism. The researcher has first-hand experience of this phenomenon in the construction industry. Highly qualified Quantity Surveyors over fifty years of age have often complained of the perception that they are over-qualified for certain practices. Others have complained that they compile and present a very good curriculum vitae but if and when the actual interview takes place, they have felt that their age or appearance has had a negative impact on their opportunity for future employment or promotion. Further research may be required to investigate how ageism could be avoided by using an MTP to include the more senior Quantity Surveyors as critical knowledge enablers to mentor the less experienced staff in the practice.

6.10 Contribution to knowledge

This doctoral research created a bespoke mentoring programme for Quantity Surveyors. The detail and application of the programme was welcomed and approved by the SCSJ and the participating cost control host practice. The research process was a real-life problem-solving process and used the *plan, act, observe and reflect* Action Research methodology. The individuals and entities who benefited and who will continue to benefit from this research were identified. The researcher intends to continue this mentoring programme with other cost control

and project management practices and will consider progressing to other disciplines and professions in the future.

The literature review and original research of this thesis about the design and implementation of a monitored tutelage programme for Quantity Surveyors has provided several contributions to knowledge. These contributions include a discussion of the theory and practice of knowledge creation, transfer and management. This discussion showed how and where it may be possible to convert explicit to tacit knowledge. It has also shown that in some cases, this is not possible in any practical way.

The sustainability of all professions depends on the transfer of knowledge. The transfer of explicit knowledge is the basis of traditional education. The transfer of tacit knowledge has been less studied and occurs in a variety of ways. Much tacit knowledge is occupation specific. This means that it is transferred in a wide variety of ways which tend to vary with the occupation.

The research in this thesis has compared the transfer of tacit knowledge in a wide variety of professions. This inter-professional comparison and analysis can be considered a contribution to the knowledge relating to successful and efficient tacit knowledge transfer.

A major aim of the thesis was to show if it was possible, to design and implement a process for the efficient transfer of tacit knowledge, specifically to graduate Quantity Surveyors.

A conclusion of the research is that it is possible to design and implement a process specifically for the transfer of this tacit knowledge to Quantity Surveyors. A broader contribution to knowledge relates to the monitored tutelage programme and the use of Action Research as the research method.

The MTP was successful largely because it followed the findings of many other investigations into the transfer of tacit knowledge. These included the existence and where necessary, the establishment of cultures of questioning and trust. A corollary of this is that the MTP is a two-way process that requires both the transmitting and receiving of knowledge, tacit and otherwise. It therefore uses action learning by both mentors and mentees.

The MTP programme as designed and investigated using Action Research principles of *plan, act, observe and reflect* is cyclical in nature. This process is well suited to the changing nature of tacit knowledge in quantity surveying and other knowledge intensive professions. The tacit

knowledge required in the profession changes as new knowledge and techniques are introduced.

A further contribution to knowledge is that the MTP process for the transfer of tacit knowledge allows the transfer process to *evolve* along with the needs of new entrants to the profession. This evolutionary process provides not just tacit knowledge but ensures that the sustainability of the process. As the business environment and the tacit knowledge requirements change, the MTP changes along with them.

6.11 How academic and theoretical knowledge has changed as a result of this thesis

‘Academic knowledge’ is a term for that part of the body of knowledge that has been built as a result of study, rather than as a result of a belief or some sort of inspiration. In the case of this thesis, the addition to knowledge becomes apparent after Chapter 2, the review and synthesis of literature. The review of the literature relating to knowledge and its division into ‘explicit’ and ‘tacit’ did not add to academic knowledge but provided the basis for the subsequent design and implementation of a method for tacit knowledge transfer.

The additions to academic knowledge were related to knowledge about the requirements for tacit knowledge transfer, the elaboration of a method for the transfer of tacit knowledge (MTP) and the discovery that with an atmosphere of trust and an ethos of questioning the MTP system achieves its goal. An added insight that resulted from the Action Research approach to the investigation of the MTP was that this approach has the capacity to evolve. This evolution takes place in two ways. The first is that it can evolve to suit the requirements of the mentees who require new tacit knowledge. It can also evolve so that the tacit knowledge components of new information and technologies can be incorporated in the transfer programme. This is an important feature in knowledge-based professions, such as quantity surveying, where demands for new knowledge constantly arise. An example would be the knowledge required to construct data centres or new challenging pharma design and build projects. New technologies also arrive in a steady stream. These need explicit knowledge about their technical operation but also tacit knowledge about how to operate them efficiently in new settings. It is considered that this dynamic evolutionary capability of the MTP is an addition to knowledge.

New contributions to theory received less attention in the research for this thesis. This is a result of the Professional Doctorate approach, which is to provide results derived as a result of academic rigour that are closely connected with practice in the workplace.

The theory is that tacit knowledge exists and can be transferred. It is useful because the transfer of tacit knowledge provides the basis of sustainability for knowledge intensive businesses and professions. This thesis has demonstrated that, with the application of existing theory about knowledge management and transfer, tacit knowledge can be successfully transferred.

The theory of Action Research based on *plan, act, observe and reflect* was tested in this research and found to hold good in the case of the transfer of tacit knowledge to Quantity Surveyors.

6.12 General conclusions

Having described the research journey undertaken for this thesis (See Figure 5.1), four general conclusions emerged from the mass of detail.

First, a monitored tutelage programme, incorporating the features described in the earlier parts of the thesis, emerged as a highly effective way of transferring tacit knowledge.

Second, it became obvious that any process for the transfer of tacit knowledge in an organisation would be resource intensive. This may not be because of the specific devotion of resources to it but because of the opportunity cost of having a non-formalised transfer programme, such as working with an experienced colleague. The cost of not having any mechanism can be even larger, as the loss of tacit knowledge will lead the eventual erosion of competitiveness and decline of the organisation.

Third, the limitation of the research due to it being based on Action Research leads to the conclusion that Action Learning and Action Enquiry approaches would also yield insights and suggestions for practice for tacit knowledge transfer. This was not done, since resources, including time for this thesis, were not limitless. It was concluded that the incorporation of Action Learning in further research would probably yield further useful results.

Fourth, the choice of a cyclical monitored tutelage programme for the transfer of tacit knowledge established a significant advance in methodology and outcome for the transfer of tacit knowledge. The advance is a result of the use of the MTP and its analysis using Action Research. The resulting programme did not just result in an effective method for the transfer of tacit knowledge. It also provided a dynamic element in so far as the process could evolve along with the tacit knowledge required by the profession. The evolutionary character of this process not only provides a competitive advantage for organisations that employ it. It also contributes to ensuring that the competitive advantage is real and sustainable.

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APPENDICES

Summary

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Appendix 2.1 Recent academic research studies with similarities to this research

Title	Author	Year	Brief Description of Research Topic	Research Similarities
1. An Investigation into the “Stickiness” of Tacit Knowledge Transfer	Alison Murray and Philomena Hanlon	2015	<p>This paper addressed the difficulties associated with tacit knowledge transfer. The authors conducted a systematic empirical investigation into the stickiness of tacit knowledge transfer. They adopted qualitative semi-structured interviews with IT support professionals. The interviewees were asked what obstacles and challenges they faced when transferring tacit knowledge. The transcripts showed a vast difference in the spread and significance of difficulties encountered. Three areas of commonality did evolve:</p> <ol style="list-style-type: none"> 1. The influence of the source on the transfer of the tacit knowledge was significantly stronger than the knowledge in general. 2. The reasons for transferring incomplete knowledge varied greatly. 3. The effect of organisation and industry culture on the tacit knowledge transfer. <p>The interview process yielded 15 examples of tacit knowledge transfer ranging from faulty equipment, storage systems, upgrading problems, software installation and individual or team break times. All this data was scored on the level of tacitness and complexity <i>etc.</i> The research concluded that 3 areas of future research were identified:</p> <ol style="list-style-type: none"> 1. How organisations culture could change to encourage tacit knowledge transfer. 2. Investigation into the motivation for transferring tacit knowledge 3. Identifying the relevance of individuals’ differing perspectives on the transfer process 	<p>Similarities and reference for this research. Investigated and highlighted problems encountered by individuals in organisations transferring tacit knowledge.</p> <p>Findings and results identified 15 example areas where difficulties arose and how this could be avoided in the future.</p> <p>Key similarities: Transfer of tacit knowledge to individuals within organisations.</p>

Title	Author	Year	Brief Description of Research Topic	Research Similarities
2. A New Framework for Defining, Identifying and Explicating Tacit Knowledge: Qualitative Research using Aspectual Analysis on SMEs	Alex Gachuhi Kimani	2017	This research investigated the different types of tacit knowledge in SMEs. Kimani pointed out that 5.50 million businesses in the UK in November 2016 are SMEs employing 0-249 people. According to the OECD SMEs are responsible for employing 60% -70% of the UK's workforce (OECD, 2012). His research discovered that transition of tacit knowledge to explicit knowledge is increasingly difficult in SMEs. He set out to resolve conflict on the nature of tacit knowledge in the literature, to create a framework for identifying types of tacit knowledge and to show how different forms of tacit knowledge can be explicated.	This study researched the difficulties of tacit knowledge transfer in SMEs. Specifically, the research concentrated on how these different types of tacit knowledge can be explicated. Key similarities: Transfer of tacit knowledge in SMEs
3. An Investigation into the Tacit Knowledge Transfer Process in an Open Plan Office Environment	Caroline Bernie	2015	This research set out to identify the “barriers to tacit knowledge transfer within an open-plan working environment and subsequent alignment of strategic goals in order to overcome these barriers”. The author used an online questionnaire process to collect her data. The research looked at organisational implications, traditions and reasons for the open-plan working arrangement. Research findings concluded that open-plan environments encourage direct communications and knowledge sharing amongst employees. It also pointed out that communication barriers could discourage certain personality types from approaching employees, peers and managers. It also found out that the open plan layout has positive implications for the transfer of tacit knowledge. Finally, open plan offices encourage enhanced innovation and may yield practical solutions for organisations.	This research investigated the “link between the internal organisational layout and its impact on the transfer of tacit knowledge”. Similar to this research it identified the organisational barriers of transferring tacit knowledge. Key similarities: Transfer of tacit knowledge in relation to organisational layout.

Title	Author	Year	Brief Description of Research Topic	Research Similarities
4. Strategic Planning in Irish Quantity Surveying Practices	Róisín Murphy	2011	<p>The author pointed out that there was a wealth of knowledge published regarding general corporate strategic planning but that there is a paucity of literature for strategic planning for Quantity Surveyors. She undertook a mixed method research with qualitative semi-structured interviews followed by a quantitative survey of selected chartered quantity surveying practices. The practices chosen varied from small single owner practices to large multi-partnered chartered quantity surveying organisations.</p> <p>The research did find that the demographic of QS practices in Ireland changes significantly with the economic boom bust climate which hinders a sustainable strategic planning for the country's quantity surveying practices. Research found strategic planning is very common, competitor analysis is seldom carried out and a top-down approach to the process is prevalent. Participation in a strategic process is limited, strategic planning tools are not used extensively, and planning is often project based and not strategic in nature.</p>	<p>Focused on the various strategies of quantity surveying practices. The researcher used interview techniques with similar practices to this research. It was a mixed methods research methodology.</p> <p>Key similarities: research into quantity surveying practices.</p>

Title	Author	Year	Brief Description of Research Topic	Research Similarities
5. Strategies to Retain Tacit Knowledge from Baby Boomers	Rhonda Jean Corvin	2015	<p>The purpose of this doctoral research was to explore strategies local government leaders use to retain tacit knowledge with baby boomers (a person born between 1946 – 1965). This qualitative case study involved semi-structured interviews and studied documentation. This research found leaders share tacit knowledge and expertise in communities of practice providing an environment for questions, dialogue and information exchange. Small teams or micro-communities consisting of 5 to 7 members working together on group projects.</p> <p>There needs to be a common language and purpose. This research was based in the United States of America where 20% of the total population will be 65 years or older by the year 2030. Succession planning is therefore essential for organisations to retain their competitive advantage.</p> <p>Mentoring was the most critical strategy used to retain tacit knowledge from baby boomers. Social change included the potential to train older workers to share tacit knowledge with new employees and to incorporate strategies to mentor new workers replacing the older workforce.</p>	<p>This research dealt with the difficulties of tacit knowledge transfer in local government. Similarities to this research included interview technique and the focus on mentoring tacit knowledge.</p> <p>Key similarities: Transfer of tacit knowledge in local government.</p>

Title	Author	Year	Brief Description of Research Topic	Research Similarities
6. A study of agile project management methods used for IT implementation projects in small and medium sized enterprises	Daniel Glen O'Sheedy	2012	<p>Agile development is one solution to the problem of overly complex methods that has been adopted in the IT industry and software production and has gained considerable popularity with smaller organisations. This research focused on SME organisations and how formalised project management methods could be used with IT implementation projects. The early development of project management was studied. The author researched back to the 15th century where large construction projects saw the introduction of engineering aspects and basic PM to ensure projects were completed on time. Project standards and PRINCE 2 were investigated in the UK, USA, Switzerland and Germany.</p> <p>The research methodology chosen was Action Research as the cyclical process allowed the author the flexibility of reworking project experience in an iterative manner. Research findings concluded that the majority of SMEs have less bureaucratic styles of management and are ill-suited to formalized project management techniques. However, using project management tools and concepts from agile development was found to be beneficial for SME projects.</p>	<p>Similarity with this research included the use of Action Research as a research methodology to investigate a complex problem. The cyclical process was also similar within this research.</p> <p>Key similarities: Action Research methodology.</p>

Title	Author	Year	Brief Description of Research Topic	Research Similarities
7. The Development of Ambidexterity as a Key Dynamic Capability for ECO- Innovation in SMEs: An Action Research Study	Margaret Tallott	2018	<p>“SMEs have a distinct and critical role to play in eco-innovation and have historically been disproportionately responsible for new market developments ... Pursuing an eco-innovation strategy requires firms to have the capability to change and adapt on a continuous basis as eco-innovations become increasingly better, thus contributing to dynamic market conditions. Both eco-innovation and sustained competitive advantage require ambidexterity to improve existing processes and technologies.” (Tallott, 2018, p. ix).</p> <p>The research strategy was an Action Research study as the author preferred having the ability of Action Research to address the practice relevance gap.</p> <p>As Action Research requires collaboration with managers, to process not only conceptual and analytical skills but also the cognitive ability to explore new opportunities and the leadership skills to integrate them into their organisations. Additionally, the emphasis is on the ‘soft skills’ of management to achieve this goal. In this study both internationalisation and collaboration were instrumental in enabling the SMEs access resources outside the boundary of their own firm.</p>	<p>Similarities with this research included the use of Action Research as a research methodology to investigate eco-innovation in SMEs. As with this research co-operation and access to management and staff was integral to the success of the research findings.</p> <p>Key similarities: Action Research methodology.</p>

Appendix 3.1 Appreciative Inquiry

As indicated previously, “Action Research is an orientation to inquiry rather than a methodology” (Reason and Bradbury, 2001). Among the sources and inspiration that have influenced this research was the advice and observations received from ARG I in the open forum discussion. One comment by Coghlan was to consider Appreciative Inquiry as a research methodology.

Having considered the positionality of the researcher, having met the workshop participants and their supervisors and HR Manager, drawing on the positives of their organisation may be the best position to start from. It would allow both the individual and organisation generally to consider what they are doing right in practice and to build upon this for the betterment of knowledge transfer within the organisation. A researcher may be tempted to start the process by dwelling on what is wrong with the organisation and what needs to be fixed. This draws on negatives, which is the opposite of ‘Appreciative Inquiry’.

To enable change for both organisations and individuals, Appreciative Inquiry as a form of Action Research offers a fresh positive bias for the stakeholders. It has been referred to as an art form, to bring something fresh to the world, a format that will inspire thoughts and actions and help generate individual and organisational flourishing (Reason and Bradbury, 2008). It challenges the participants to source and encourage the good, the better and where possible the exceptional - through participative questioning and working through or building upon the positive elements of their working experiences. It is about sharing and caring for others and encourages the weaker in the community or organisation to live through an enriching experience by way of discourse and dialogue. Appreciative Inquiry should be a generative process to combine research and action, inquiry and intervention. It does this by creating knowledge that enables the participants in this creative process to take part in a process of simultaneous practical experimentation and the implementation of transformative ideas.

Appreciative Inquiry is a positive Action Research model which encourages the organisational stakeholders to develop meaningful organisational change. When this model was first introduced in 1987 by David Cooperrider and the late Suresh Srivastva, it was a reaction to the perceived overuse of problem-solving sessions. These sessions had focused on the negative practices of an organisation in order to address and resolve them, At the end of the 20th century most OD models were based on the negative aspects of what was *wrong* with an organisation and how it could be fixed. Cooperrider and Srivastva believed that organisational change was

only limited by conversation, dialogue and interaction by all stakeholders. Appreciative Inquiry focuses on the best of what is, in order to imagine what could be (Bushe, 2011). For Appreciative Inquiry to be useful there must be a compelling reason for collective design. The participants must not be present as a result of persuasion, incentives or coercion. Workshops should be led by conversation and stimulated by positive questioning. “Appreciative Inquiry is not a deficiency model; it is an efficiency model of what is working well and how it can be further improved. It is intended to be a contribution of significance to society and is based on the understanding that knowledge can empower and enlighten those who strive for change” (Cooperrider and Srivastva, 1987, p.160).

Speaking about Appreciative Inquiry, Coghlan (ARGI Colloquium 2017) gave a comparative example of two neighbours and how they each approached the upgrading of their gardens and lawns. One dwelled on how their garden was so bad, that action was needed and employed a crew to remove all debris, rubble and waste and to rotovate, water and roll out a new lawn, preferring to consider some planning at a later date. The second considered what they wanted from their garden. They considered a play area, a seated area, a glasshouse, a tool shed, orientation, plant types, privacy, colour, odours, plant survival, maintenance and long-term life cycle cost versus budget restrictions. Dwelling on the positives and the appreciative aspects would allow the second garden example to enjoy a sustainable space with a future legacy of achievement and success.

Coghlan concluded by stating “You are human beings with a pulse and heartbeat. You are not cogs in a wheel. You are the ingredients of meaningful change if your organisation is to flourish and succeed”.

Dwelling on the negatives and focusing on what is wrong with an organisation may lead to further negativity or dysfunction. The result of this might be further failure for the entire organisation. Therefore, through interviews and open debate, Appreciative Inquiry sets out to understand the potential strengths via motivation. It paves the way forward in a positive fashion.

The following principles of Appreciative Inquiry were discussed by Coghlan (ARGI Colloquium, 2017).

1. Constructivist principle

This principle concerns the stimulation of new Organisational Development (OD) ideas through stories, images and reflections to generate new possible actions. Participants should

not become disconcerted by the conversational sessions. The purpose of this open dialogue discourse is stimulation leading to positive change.

2. Principle of simultaneity

This principle relates to conversational sessions. It requires participants to come to the table open minded, honest and above all ready to embrace positive change. Participants have the real possibility of developing a new legacy. Dialogue could result in sowing the seeds of change. Participants must be passionate, inclusive and possess a willingness to open their hearts and minds to effective change.

3. Poetic principle

This principle recognises that conversation is not purely about words. It is about how we weave meaningful thought just as a poet might, into well-structured wording to get people thinking about our life, our role, our attitudes, our contributions and more importantly remaining energised within our organisation and not to go stale in our employment function. We need to inspire and be inspired if we are to flourish as human beings.

4. Anticipatory principle

This principle posits what we as individuals do in the organisations today and how this will guide the OD future. We must try to fashion our thoughts and beliefs. We must try to create positive imagery of where we, as an organisation, are heading, both nationally and internationally.

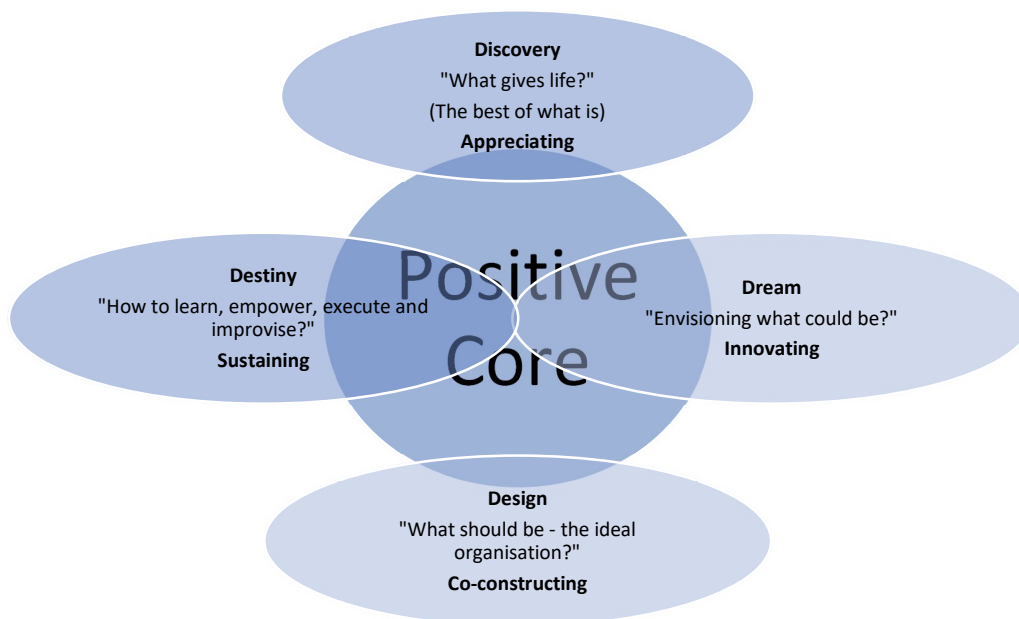
5. Positive principle

The positive principle states that if participants or stakeholders are to make positive change, they need to work on displaying hope and excitement. They should not be lethargic. Participants and stakeholders in the change process should engage with each other, be open, encourage creativity and be flexible.

Bushe (2011) summarised the comparison of Appreciative Inquiry and traditional problem-solving sessions. He concluded that the difference is that with problem solving one is endeavouring to solve a problem but with Appreciative Inquiry one is embracing an organisational mystery. Bushe also asserts that the organisation should, via appreciative enquiry build around what is working rather than what is not working.

Action Research is about organisational and individual change and Appreciative Inquiry relates to building on the positives individually and collectively to support a positive change.

This research carried out for this thesis set out to achieve positive change utilising Action Research and Appreciative Inquiry. According to Cooperrider and Sekerka (2003), in organisations when strength works with strength, when inspiration combines with inspiration, the people are liberated and empowered to change. Using Appreciative Inquiry for organisational or institutional change requires co-operation of the best and those displaying potential and willingness to change. The first step for change using this method is to recognise, identify and leverage strengths within the core of the organisation (Ludema and Fry, 2008). Their four Appreciative Inquiry steps are illustrated in Figure 3.4:



Positive Core (Ludema and Fry, 2008)

The following section outlines the stages of testing and validating the collected data. It also explores how Appreciative Inquiry can be used to achieve the research goal (Ludema and Fry, 2008). The specific stages for testing and validating the research are discussed in Chapter 5.

Discovery Stage

The purpose of this stage is to investigate, search, highlight and focus on the strengths embedded within the organisation. This process requires the assistance of the HR department to facilitate access to individuals, their qualifications and experiences and for meeting each of the potential participants in the research. The goal is to work with both the organisation and individual.

Dream Stage

When the best of what exists in the organisation has been identified and agreed by both the researcher and the organisation's HR Manager the next stage is to consider or dream of what could be. The driving force of this stage is to progress by asking positive questions in order to paint a compelling picture of the organisation's potential. As Ludema and Fry (2008) emphasise, this stage should align with the individual's deepest hopes and highest aspirations.

Design Stage

Having achieved the articulation of peoples' hopes and dreams for both their organisation and for them personally, the next stage is to design the organisational architecture including the values, structures, training and working relationships. Through dialogue and debate the participants work together to energise the organisation in the long term.

Destiny Stage

This final stage is to seek innovative ways to break down, analyse and bring the organisation closer to the participants' ideal. Appreciative Inquiry as a subset of Action Research principles and practice enables individuals and organisations to build on their strengths to meet their challenges. The Appreciative Inquiry process is as follows:

1. Identify current strengths and successes.
2. Identify factors that enable this success.
3. Try to envision the desired future.
4. Try to innovate and build greater support in the organisation, to lead towards an OD future which is collectively desired.
5. The organisation gets better by enabling our, (*i.e.*, the members of the organisation), best work.

Appendix 3.2 refers to the Seventh Colloquium Action Research Group Ireland (ARGI) held in University College Dublin (UCD) 29th - 30th June 2017.

Theme: Appreciating Action Research

Consisting of Workshops, Ethics Forum, PhD Workshops and open forum discussion on Action Research. Keynote Speakers: David Coghlan and Danielle Zandee.

Presentation Tony Boylan UCD 29th June 2017

Report for Action Research Colloquium

Appreciating Action Research

University College Dublin 28th- 30th June 2017

To What Extent Can the Transfer of Tacit Knowledge from Seasoned Professionals Benefit Graduate Quantity Surveyors?

Abstract

Purpose – This abstract is an interim update on research to date leading to further study and research for a Professional Doctorate dissertation to Salford University Manchester.

The acquisition of implied knowledge by quantity surveying graduates differs with the variety of practices. Implied or tacit knowledge can also be defined as “know how” in any industry. When a graduate qualifies and is fortunate enough to gain employment their perception may be of a journey’s end as opposed to a journey commencing. Training methods for young Quantity Surveyors vary with the practice types and it may take some years before the practice employer recoups their investment in a graduate. At the other end of the employment cycle spectrum is the retiring or retired professional who has spent a lifetime accumulating tacit knowledge. The framework of this research is to investigate the potential for transferring this valuable knowledge in a structured and monitored tutelage programme in order to capture potentially lost knowledge from seasoned professionals to new graduates. This research will assess and evaluate the knowledge gap that may occur with retiring professionals and to develop a process to prevent this loss of knowledge reoccurring.

Methodology, ontology and approach to this study- The qualitative research methodology for this research is Action Research and the research methods included a pilot workshop with experienced mentors, a 50-point structured questionnaire to sixty project management post graduates in Trinity College Dublin and interviews, yet to be carried out with graduates and employers following implementation of a monitored tutelage programme. The participating graduates and tutors are co- researchers in this repetitive Action Research cycle.

Action Research was chosen because it is a cyclical sequential process to establish what the graduate knowledge acquisition problem is, acting out a real-life analysis and solution for the

problem, critically reflecting the experiential process and repeat in repetitive fashion to improve the individual and organisational knowledge.

Main Findings – Work to date included a pilot workshop with graduate construction professionals and experienced mentor coaches in August 2015, data collection in Trinity College Dublin April 2017. Ethical approval was granted in advance on both occasions by Salford University Manchester.

Issue causing concern at this stage of research – In summary the thesis topic is tacit knowledge transfer from experienced and seasoned professionals and how best to structure this transfer to graduates in a Monitored Tutelage Programme (MTP). The original working title to capture this potential lost knowledge was “Grey Matters”. The reason for choosing Action Research was the desire to commit to “learning by doing” and the MTP mentoring cells are envisaged like Action Learning sets with a facilitator acting as a coach/mentor. Is this research methodology truly Action Research?

Keywords- Tacit knowledge; retired professionals; coaching; counselling, monitored tutelage programme; change management.

Tony Boylan

28/6/2017

Appendix 3.3

Letter from University of Salford Manchester dated 26th March 2018, Ethics Application STR1718-24 - *How a monitored tutelage programme could enhance the tacit knowledge and skill set of a quantity surveyor*. This letter outlines confirmation of Ethical Approval application STR1718-24.



Research, Innovation and Academic
Engagement Ethical Approval Panel

Research Centres Support Team
G0.3 Joule House
University of Salford
M5 4WT

T +44(0)161 295 5278

www.salford.ac.uk/

26 March 2018

Tony Boylan

Dear Tony,

RE: ETHICS APPLICATION STR1718-24: How a monitored tutelage programme could enhance the tacit knowledge and skill set of a quantity surveyor

Based on the information you provided, I am pleased to inform you that your application STR1718-24 has been approved.

If there are any changes to the project and/ or its methodology, please inform the Panel as soon as possible by contacting S&T-ResearchEthics@salford.ac.uk

Yours sincerely,

A handwritten signature in black ink that reads 'A Higham'.

Dr Anthony Higham
Chair of the Science & Technology Research Ethics Panel

Appendix 4.1 refers to the Pilot Workshop, venue Ormond Meeting Rooms, 31-36 Ormond Quay, Dublin 1, held on the 10th August 2015.

Chairperson: Tony Boylan

In attendance: Tutor 1 and Tutor 2 (Mentors)

In attendance: Four Postgraduates (Candidates)

Candidate 1 feedback (page 1-12 stenographer notes)

Quantity Surveying postgraduate in fulltime employment with Chartered Quantity Surveying firm.

Candidate 2 (pages 1-7 stenographer notes) Quantity Surveying postgraduate in fulltime employment with a large Building & Civil Engineering firm.

Candidate 3 (pages 1-11 stenographer notes) Quantity Surveying postgraduate in fulltime employment with a large Building & Civil Engineering firm.

Candidate 4 (pages 1-12 stenographers notes) Postgraduate working with large Mechanical & Electrical company.

Transcript of summation meeting (pages 1-10 stenographer notes)

Present Tutor 1 and Tutor 2

Present Chairperson

Interviews and appearances

Candidate 1 (stenographer notes 1 -16)

Candidate 2 (stenographer notes 1-14)

Candidate 3 (stenographer notes 1-16)

Candidate 4 (stenographer notes 1 – 16)

Stenographer Notes and detailed transcripts are available on request.

Appendix 4.2:

PowerPoint Presentation to Trinity College Dublin and a letter of approval giving 'Permit to conduct questionnaire survey' dated 3rd January 2017.



COLÁISTE NA TRÍONÓIDE, BAILE ÁTHA CLIATH
Ollscoil Átha Cliath

TRINITY COLLEGE DUBLIN
The University of Dublin

3rd January 2017,

Mr. A. Boylan,
The Smithy,
Waterfall Road,
Enniskerry,
Co. Wicklow.

Dear Mr. Boylan,

Re: Permit to conduct questionnaire survey

As director of the postgraduate course in Project Management, I am pleased to confirm that you have permission to conduct a questionnaire survey of the students on this course as part of data collection for your professional doctorate.

I also confirm that I will be present when the questionnaire survey is being carried out to ensure it is conducted in accordance with Trinity College's Ethics Policy.

Yours sincerely,

Dr. T.L.L. Orr
Course Director.

Tony Boylan

Research Title

To What Extent Can the Transfer of Tacit Knowledge from Seasoned Professionals Benefit Graduate Quantity Surveyors

University of Salford

1

Questionnaire

- The distributed questionnaire (3 sections)
- What this questionnaire is about
- Why this data is required
- Why this class has been chosen
- Why your consent is required
- Use of data collected
- Once the data is collected and analysed then the basis for the need and what would be required by a Mentored Tutorage Programme.

University of Salford

2

Consent

- Trinity College Project Management Post Graduate Programme has agreed to this questionnaire session taking place.
- A consent form is distributed to the class. If you wish to participate please sign the circulated form.
- If you wish to withdraw from participating now, during or after this session please feel free to do so.

University of Salford

3

Data collection and protection

- All data collected today will remain confidential.
- All returned questionnaires will remain anonymous and unsigned but will be numbered when collected.
- The data will be stored under lock and key plus the analysis will be stored on a password protected computer at my home accessed only by the researcher.
- Data will be stored and archived for a minimum period of three years after graduate award.

University of Salford

4

Summary

- Thank you for your participation.
- This questionnaire will now take approximately 20 minutes to complete.
- Any questions before we commence?

Thank you to Trinity College for facilitating this questionnaire session.

University of Salford

5

Appendix 4.3 Copy of the Trinity College Dublin Questionnaire

Title of Research:	To what extent can the transfer of tacit knowledge from seasoned professionals benefit graduate Quantity Surveyors?
--------------------	---

This questionnaire concerns knowledge management and knowledge transfer. Your group of Post Graduate students have been targeted to provide valuable data to assess individual and organisational mentoring and training requirements.

There are 3 sections to this questionnaire:

1. General profile multiple choice questions
2. Yes/No questions relating to your career development
3. Open questions giving you an opportunity to comment plus your individual responses.
If you require extra writing space, please reference the question and continue writing on the reverse side of page 7.

Research Aim

To develop a mentoring/coaching programme for graduate Quantity Surveyors to enhance tacit knowledge transfer from seasoned professionals.

Your response to this three-part questionnaire will be treated with anonymity and confidentiality. No individual or company name will be identified in the subsequent analysis. Please note you are not to sign or include your signature on this questionnaire.

Should you not wish to take part in this questionnaire/survey please feel free to leave any time.

Section 1 – General Profile Questions 1.1 – 1.10

1.1 Age Group – please tick the box with age group appropriate to you

- 00 – 30 years
- 31 – 40 years
- 41 – 50 years
- 51 – 60 years
- 61+ Years

1.2 Profession (Work Title) – please tick the box containing the profession/work title most appropriate to you

- Administration
- Architect/Designer
- Engineer Civil/Structural
- Project Manager
- Quantity Surveyor
- Services Engineer
- Other (Please specify _____)

1.3 Education Level please tick the highest academic level you have achieved

- Secondary School Leaving Certificate or equivalent
- Academic/technical college level diploma
- Undergraduate Degree Level 7 (General Degree)
- Undergraduate Degree Level 8 (Honours Degree)
- Postgraduate Degree Level 9 (Masters)
- Postgraduate Degree Level 10 (Doctorate)
- Other (Please specify _____)

1.4 Employment Status please tick the relevant box to capture your current employment status

- Self Employed
- Working Irish company
- Working for International company
- Unemployed
- Other (Please specify _____)

1.5 Work base location - please tick the relevant box to confirm your current work location type

- Construction Site based
- Office based
- Co-Located
- Home Office based

- Other (Please specify _____)

1.6 Size of Organisation – indicate the size of your current employer

- Self Employed
- Small Firm - (2-20 employees)
- Medium Firm - (21 – 100 employees)
- Large Firm – (101+ employees)

1.7 Age of Organisation – indicate how long your current organisation is in operation

- Newly started (within the last 12 months)
- 1 – 5 years
- 6 – 20 years
- 21+ years

1.8 Do you network with peers in your industry?

- Former College Classmates
- Job colleagues
- Colleagues from within the industry
- All
- Other (please specify _____)

1.9 What initially motivated you to follow your current career path?

- School Career Guidance
- Family member influence
- Assumption of regular employment
- Assumption of good salary
- Other (please specify _____)

1.10 Have you experienced bullying?

- Never
- At School
- At University/College
- In your employment
- Other (Please specify _____)

Section 2 – “Yes/No” Questions 2.1 – 2.30 – Please tick or circle the relevant box for each question

Relates to: Academic qualifications & achievements	Relates to: New Entrant Induction Procedure Formal or Informal introduction to your department & duties following Commencement of your employment	Relates to: Interaction with Peer to Peer; Supervisor; Go To Person if/when project problems arise in your organisation	Relates to: On Site or Off Site mentoring or training to supplement your work; external mentoring programme to support your decision making and knowledge management within your organisation	Relates to: How your training and development experience could assist new graduates entering your organisation
2.1 On qualifying to your current status, are you adequately prepared for your employment tasks?	2.7 Did you receive a formal induction to your current organisation?	2.13 When project difficulties arise, do you resolve these issues yourself?	2.19 Did you receive regular upgrading and training to support decision making within your organisation?	2.25 Have you been consulted for your input on the design and development of a graduate induction programme?
2.2 Have you had relevant work placement experience prior to taking on your role as a professional?	2.8 Did you receive training to carry out your job/tasks?	2.14 When project difficulties arise do you resolve these issues by consulting with your peer to peer colleagues?	2.20 Is work related training and upgrading available in-house?	2.26 Would a "lessons learned" process assist in the prevention of procedural errors in projects?
2.3 Did the topic range in your academic qualification facilitate you to competently carry out your employment tasks?	2.9 Was the induction procedure consistent across all new inductees?	2.15 When project difficulties arise do you resolve these issues by consulting with your supervisor/employer/go-to person?	2.21 Would problem solving be more beneficial if solution training was shared with competitive/like minded organisations?	2.27 Are adequate safeguards in place to ensure effective staff competency levels for carrying out significant project tasks?
2.4 Did you consider remaining in education prior to your first employment?	2.10 Did you have an input into the review and revision of the new entrant induction process?	2.16 When project difficulties arise do you resolve these issues by seeking a solution external to the organisation?	2.22 Is work related training and upgrading more beneficial from external training?	2.28 Would your recently acquired experience be of benefit to a new entrant or graduate co-participating in an external training programme?
2.5 On completion of your academic qualification, did you feel motivated and enthused to take on the challenge of your first employment role?	2.11 Did you receive feedback on your interview and induction performance?	2.17 Have your communication skills improved sufficiently since commencing your career?	2.23 If a Monitored Tutelage Programme (now explained) existed, would you consider taking part?	2.29 Do you stay in contact with ex colleagues and former peer groups?
2.6 Did you experience fear/trepidation on taking on your first employment role?	2.12 Would you consider a refresher induction process or assistance regular intervals?	2.18 If you have experienced an error during your employment, have you learned a lesson from that experience?	2.24 In your opinion do you contribute to the core competency of your organisation?	2.30 Do you plan to pursue further study in order to progress your knowledge base?

Title of Research:	To what extent can the transfer of tacit knowledge from seasoned professionals benefit graduate Quantity Surveyors?
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Section 3 – Open Questions 3.1 – 3.10

3.1 At this point in your career name one topic that, in your opinion would best benefit your career development?

3.2 As a postgraduate, what do you currently see as your greatest strength to your organisation?

3.3 As a postgraduate, what do you currently see as your greatest weakness to your organisation?

3.4 Does your organisation have a problem with the loss of critical knowledge? For example: ‘In-house’ expertise dealing with specific projects and challenges. If Yes, please elaborate.

3.5 . Would you have a recent example of lost critical knowledge in your organisation?

3.6 Does your organisation have exit interviews and if so do they take them seriously?

3.7 Has your qualified and experienced staff handled critical events or project dilemmas adroitly/cleverly? If Yes, please elaborate.

3.8 Do you think mentoring/coaching workshops would support and offer assurances to your knowledge seekers? If Yes, please elaborate.

3.9 Do you think personal learning goals would be supported by mentoring/coaching workshops? If Yes, please elaborate.

3.10 Could role play of typical project dilemmas be used as training simulations in your organisation? If Yes, please elaborate.

Thank you very much for taking part in this questionnaire/survey.

Appendix 4.4 Open forum discussion Trinity College Dublin (8/04/2017)

At the concluding stage of the questionnaire session on 8th April 2017 an ad hoc open forum discussion emanated from the class of PM students. This lasted twenty minutes and revealed some interesting processes.

Generally, questions from the class (PM group of 60 Post-Graduate students)

Each question debated by several people voicing own concerns and experiences regarding loss of critical knowledge and knowledge management generally in their employer organisation.

Class A – “Our firm (contracting) have a staff of more than 600 personnel but middle management has greatly depleted in the recent past, mostly head-hunted by competitor firms in the industry. As a result, senior management have stepped back into work roles to fill the gap. These senior managers have had a different function in our firm for the past 5 – 10 years and are not IT savvy for example. I feel we are heading into chaos and will very quickly become both disorganised on site and uncompetitive in tendering for new work.”

Researcher – “anybody in the room got a suggested solution?”

Class B – “Obviously it may be too late to address this activity, but surely junior experienced staff could be promoted and/or incentivised to step into the breach?”

Class C – “Not the answer/solution in my opinion. They should have had a policy of not allowing key management to leave the company with valuable skills and information if adequate succession planning is in place then the knowledge doesn’t leave the organisation. Surely the manager has a loyalty and responsibility when promoted that he/she cannot simply walk away with minimum notice.”

Class B – “I think there are three options:

Promote staff under the supervision of senior managers over a defined period.

Advertise in the local market and beyond to attract similar or better experienced staff.

Prevent, under contract and by agreement middle managers from leaving until a trained replacement is in position”

Class C – It’s never as simple and straight forward as that (these three options), e.g., if someone is disgruntled, they could simply leave with minimum notice. It’s the responsibility

of the board members to ensure this vacancy does not happen and to have a secure contingency in place.

Class D – Is there not such a thing as “Key Man” insurance?

Class C – Yes, but only if the key person is a director, to the best of my knowledge

Class E – Perhaps middle management should be multi-functioning and in the event of the loss of a manager a colleague could step into the various functioning gaps for a short period. This way the managers at a certain level must share their organisational knowledge on a regular basis. For example, managers may not only leave to work for a competitor. This could also happen if an employee becomes ill or is absent on sick leave and they hope to return to their position when recovered.

Class F – “I think we should have a similar practical and academic learning scenario as accountants. Our company have several accountants in each regional office. We are a large civils contractor with offices in Ireland, Northern Ireland and UK. There are six progression stages in order to reach final accountancy qualification. Up to final qualifications they are accountant technicians or “part accountants”. Our company embarked, last year on an intensive training programme using both internal and external consultants to get all unqualified accountants across the line with their qualifications and studies. Some people welcomed the help others, especially those who had given up on the qualification route for family or career reasons were reluctant. Our company offered a bonus incentive for every one of the six stages of the qualification achieved pro rata with remuneration. While it wasn’t initially welcomed it created a compadre within the company’s accountants. It meant the regional offices were now talking to each other and they had a common training and qualification goal. The only negative, if there was one was the fact that the construction professionals probably felt a little isolated, so I felt, and I’m not alone in this – other sectors in the company should do the same, i.e., site managers with the CIOB, Quantity Surveyors with SCS/RICS and our designers with IEI and RIAI.”

Researcher – “I think it is an excellent example of participative knowledge sharing through on the job “learning by doing”. Any other comments on this aspect (open to the floor)?

Class G – What if you absolutely don’t want to participate, for whatever reason – are you ostracised by management and would you fear that your job or career is now under threat?

Class F– To be honest, it did not happen in our company. Initially some accountants were reluctant were to take part eventually all agreed to participate.

Researcher – “was this because the training structure for the accountants was” well thought out” in advance, *i.e.*, were those potential sensitivities planned and provided for.

Class F - Possibly – all I can say it’s working very well for them and it’s teach people to share and not to be too greedy with knowledge or assisting to do and specific task or job.

Researcher – “Are there any other areas that you feel are blatant or obvious omissions from your training to date”

Class H – As a Quantity Surveyor I’m sure other professions may have a similar view but the non-exposure to the other side of the commercial set up in our profession i.e., if you work for a contractor and stay in that position for a number of years it makes it very difficult to make the transition to a PQS firm because your experience has been contractor QS including claims, trying to make a job profitable, trying build up case for delays and disruption etc. it leaves you “pigeon-holed” for possibly the rest of your career and at a distinct disadvantage when interviewing for a job change if you apply for PQS job.

Class generally agreed with this comment!

Class I – I’m a chartered engineer and it’s the same for us engineers. It’s not just surveyors. It would help our career choice option if we had dual experience of working for the client and design on one hand and then having the option to work for a contractor with a different goal of trying to make more profit for a contractor and claiming for design shortfalls etc. on the other hand which may be buried and hidden from the client otherwise.

Class H – I don’t necessarily see this risk of pigeon-holing in your career as a blatant omission of training, but I do think this current generation (millennials) lack communication skills particularly hey lack the confidence to ask questions i.e., they like to give the perception that they know everything and to be seen lacking in a skill may be an admission of failure.

Class I – I agree young graduates need to ask more questions if they are to learn skills otherwise how their senior personnel know what gaps they are experiencing in their training and education.

Class generally agreed that having the confidence to ask the relevant questions would be a major improvement for acceleration of transferring knowledge.

Open forum discussion ended.

8th April 2017.

Appendix 4.5 Statistical Compilation from Questionnaire Data Collection (8th April 2017).

See Appendix 4.3 questionnaire document.

The questionnaire referred to in Chapter 4 of this thesis relates to a presentation by the author in Trinity College Dublin to a class of 60 post graduate project management students. The presentation consisted of an introduction by the course director TCD explaining the purpose of the questionnaire and explaining why TCD agreed to participate in the questionnaire. The author then distributed 60 questionnaires and brought the class through the presentation and format of the questionnaire. Consent forms were signed by the class following the presentation and collected by the course director.

The questionnaire consisted of three parts:

Section 1 General profile questions (1.1-1.10), 10 questions

Section 2 Yes/No questions (2.1 – 2.30), 30 questions.

Section 3 Open questions for individual comments (3.1/3.10) 10 questions

On collection of the completed questionnaires the return rate was 93% (56 of 60 participants).

All completed questionnaires (56 number) are available on request.


All statistical compilations from collected data are available on request.

Appendix 4.6 Refers to first workshop MTP 1 PowerPoint presentation 2017.

Tony Boylan

- BSc (Surv), MSc, FRICS, FSCSI, FCIQB, FCI Arb, Dip Con Econ, Dip Proj Man, Dip Arb Law

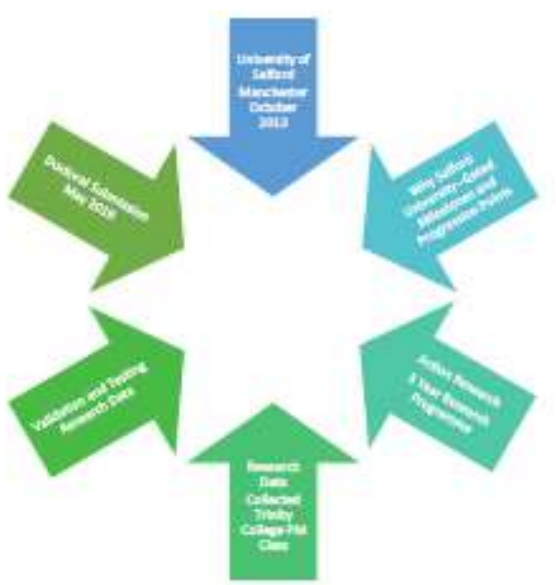
• How a Monitored Tutelage Programme Could Enhance the Tacit Knowledge of a Quantity Surveyor



Tony Boylan Chartered Quantity Surveyor

1

Doctoral Journey to Date



Tony Boylan Chartered Quantity Surveyor

2

Knowledge Transfer

Explicit and Tacit Knowledge Transfer

Organisational Critical Tacit Knowledge


Workshops and Mentoring Programmes

Leadership and Knowledge Transfer


Tony Boylen Chartered Quantity Surveyor

3


Subject of MTP No 1:
Communication Skills and Ability to Ask Relevant Questions




Attending: Selected Participants,
Coach/Mentors & Facilitator Researcher



Presentation by Mentors and Knowledge
Exchange: learning by doing



Peer to Peer Interactive: Follow up Session



Feedback to Participants on Modules
Initiation of a Community of Practice

Tony Boylen Chartered Quantity Surveyor

4







5



6

Subject of MTP Module No 4:
How Other Professions Handle Knowledge Transfer Through Coaching/Mentoring

- 
Attending: Facilitator, Student Participants, (know their strengths & weaknesses) & Coach/Mentor
- 
Presentation by Mentors: Knowledge Exchange: Learning by Doing
- 
Peer to Peer Interactive: Follow Up Session
- 
Feedback to Participants on Module 3
Initiation of a Community of Practice

Tony Boylen Chartered Quantity Surveyor

7



@tibbr

Before you leave, Frank here wants to 'retain' the knowledge you gained while working for us.

Tony Boylen Chartered Quantity Surveyor

8

Appendix 4.7 refers to a summary of the Four monitored tutelage programme (MTP) workshops (1 – 4).

MTP 1: *Communication skills and ability to ask relevant questions.*

Venue - Linesight offices, Dublin; Date 17th August 2018. Attendees: Mentors 1 and 2 (PR and Communications experts). Five Quantity Surveying Candidates.

Breakout session for MPT 1 held on 22nd August 2018. All presentation notes and feedback for MTP 1 are available on request.

MTP 2: *Role of General Contractor and Site Based Quantity Surveyor.*

Venue - Linesight offices, Dublin; Date 29th August 2018. Attendees: Mentor Quantity Surveying Director large Dublin Based Building & Civil Engineering contractor. Four Quantity Surveying candidates.

Breakout session for MTP 2 held on 4th September 2018. All presentation notes and feedback for MTP 2 are available on request.

MTP 3: *Creating a sustainable knowledge retention programme and implementation of a qualification attainment scheme for Quantity Surveying organisations.*

Venue - Linesight offices, Dublin; Date 25th September 2018. Attendees: Mentors S.C.S.I. Education Director and Human Resources Manager and Eleven quantity surveying candidates.

Breakout session for MTP 3 held on 16th November 2018. All presentation notes and feedback for MTP 3 are available on request.

MTP 4: *Mentoring a strategic fit. How other Professions manage mentoring of Professionals.*

Venue - Linesight Offices, Dublin; Date 11th February 2019. Attendees: Senior Mentor Engineering Profession. Five quantity surveying candidates.

Breakout sessions for MTP 4 held on 14th February 2019. All presentation notes and feedback for MTP 4 are available on request.