LEARNING OFF THE JOB:

ENGINEERS AND PROFESSIONAL EDUCATION

Ann Marjorie Butchers

Submitted in partial fulfilment of the requirements for the degree

of

Doctor of Education

Supervisor: Professor Gary McCulloch

School of Education

Department of Educational Studies

University of Sheffield

October 2003

Preface and Acknowledgements

I am anxious to preserve the confidentiality and privacy of the staff and students of the institution that is at the centre of this case study. To that end I have altered certain names of the institution, students and their employers to preserve their anonymity. I was privileged to be allowed access to some internal documents, relevant parts of which have been incorporated into this research. There is a separate list of documentary sources referred to at the end of the study.

Because of the specialised nature of the Centre in which I work it has been necessary to include a list of abbreviations, together with explanations of some commercial terms. The list of commercial terms has been included at the back of the thesis.

This thesis would never have been completed without the help and encouragement of a great many people. I would like to take this opportunity to express my gratitude to them. Firstly thanks to Andy Maslen from Staffordshire University for his initial guidance and encouragement when I began this journey.

Thanks also to the twenty-four participants who gave up their valuable time and from whom I have learned so much. It has been a privilege to hear their reflections, which have become a fundamental part of this research. I would also like to thank my colleagues at 'Midshire' for their help and guidance and for the financial and other support without which I could not have completed the study.

Gary McCulloch who has stuck with this through thick and thin and pointed me in directions of which I never would have dreamed, without his fortitude and professionalism I would not have achieved thus far.

Last but not least I must mention my family and friends. My friends who have tolerated long silences when I have been otherwise engaged; my husband Chris, for keeping the kettle on and the garden at bay; Judy Brown and my sons Stuart and Alistair for IT and editorial assistance when I needed it most.

Abstract

LEARNING OFF THE JOB: ENGINEERS AND PROFESSIONAL EDUCATION

This thesis identifies a framework of critical occasions documented by engineering students taking residential modules during the taught element of an MSc. It develops a categorisation of critical events on which future research could be built and will be of interest to practitioners, learners and academics. Building on this nomenclature the effect of important episodes on respondents' cognition and professional development is examined by applying fuzzy logic.

Using a reflective interview based case study students were questioned about their background, attitudes and landmark events to investigate the classification. A focus group provided another perspective and validated early findings. The choice of a case study and use of interviews are discussed within the methodology.

Previous literature on critical incidents, professional development and cognition was considered to illuminate the framework. The resulting data was analysed and patterns identified in the fieldwork chapters to catalogue the critical happenings. The developing professional identity of respondents is another area examined providing an insight into how and why such professional development occurs.

Findings include: that milestones volunteered were representative of critical episodes found in previous writing and that attitudinal changes revealed within the subsets of Apprentices and Graduates appeared to converge as the course progressed. Practitioners may facilitate critical incidents and so enhance their own professional development. Learners will be interested to know that discussions with respondents highlighted occasions that resulted in increased cognition, improved confidence and presented opportunities for networking leading to professional formation.

For academics the research presents ways in which students learn using critical thinking, highlighting a continuum of critical happenings on which future research could be encouraged. While offering no strong claim to generalisability the taxonomy identifies areas for further examination, which could lead to generalisability in the future.

List of Abbreviations

****	Expletive deleted
ACCA	Association of Chartered Certified Accountants (my professional body)
ADGS	Academic Director of Graduate Studies
Aero Coy.	Refers to an employer in the Aerospace industry
ASM	Applied Statistical Methods (Module)
Auto Coy.	Refers to an employer in the Automobile Industry – i.e. Car assembly
Auto Rel. Coy.	Refers to an employer in a company related to the Auto industry - i.e. manufacturing parts
BP & SM	Business Policy & Strategic Management (Module)
CD	Creative Design (Module)
CIPS	Chartered Institute of Purchasing & Supply
CIT	Critical Incident Technique
DIP	Director of Industrial Programmes
DMS	Diploma in Management Studies
EBM	Engineering Business Management (MSc.)
EdD.	Doctor of Education
EngD.	Engineering Doctorate
F1 – 5	Focus group participants
FACS	Financial Analysis & Control Systems (Module)
Fundamentals	MFG's induction module
Gen. Eng. Coy	Refers to an employer operating in the general engineering industry
HR	Human Resource
IE	Industrial Engineering (Module)
IGDS	Integrated Graduate Development Scheme
INS	Innovation Strategy (Module)
IPP	Improving Personal Performance (Module)
IT	Information Technology
LSP	Leadership (Module)
MBA	Master of Business Administration
MC	Management of Change (Module)
MD	Managing Director
MFG	Manufacturing Group
Midshire	The University on which this research is founded
MSE	Manufacturing Systems Engineering (MSc.)
NHS	National Health Service
NRG	Non-relevant Graduate
O/HNC	Ordinary / Higher National Certificate
P1 - 3	Pilot interviews
PA	Personal Assistant
PED	Post Experience Diploma
PMAs	Post Module Assignment
PMIP	Programme Manager, Industrial Programmes
Q&R	Quality and Reliability (MSc.)
QMT	Quantitative Methods & Techniques (Module)
R&D	Research and Development
SME	Small and Medium sized Enterprises, as defined by the Companies Act 1985.
UGC	University Grants Committee
VC	Vice-Chancellor
X	Refers to a different institution

List of Tables and Figures

LEARNING OFF THE JOB: ENGINEERS AND PROFESSIONAL EDUCATION

Contents

CHAPTER ONE

1 Introduction

1.1 Background and Aims

> *Engineering management is a new discipline, being a Post World War II phenomenon....What is required is a new breed of engineering managers or manager engineers...[able] to face the challenge continually if they are to remain effective....Engineers have a distinct advantage when they come to assume a managerial role – they are accustomed to change. (Kharbanda and Stallworthy 1990:5/30)*

At a working party in January 1999 to review a finance module between academic staff and industrial partners at the Manufacturing Centre [MFG] where I work, one industrialist observed that engineers are "not good at putting their case across". He held that engineers were disadvantaged at management meetings, by a perceived lack of competence to argue their case. This thesis seeks to demonstrate that students who undertake an MSc. in Engineering Business Management [EBM] at MFG are well able to hold their own with colleagues in a management team. This study brings together education and business ideals in a synthesis to determine if the teaching model adopted at MFG can satisfy the hard-nosed realities of modern manufacturers by creating agents of change.

To do this, the study builds on previous research to examine ways in which cognition develops. It reviews the nature of memory and different types of critical occasion that may effect such comprehension. Finally it appraises the impact of these events on professional development. The research links with the ideas of the Finniston Report that engineering pervades all areas of activity from manufacturing through to leisure, making it necessary 'to meet change with change' (1980:18). It is so far as I am aware, the first time a study of this kind has been carried out.

This study examines the nature of critical events when considered from the viewpoint of engineering students undertaking a part-time taught Masters Course at a leading University in the Midlands [Midshire]. The research is based in the Department of Engineering, where the MSc. programme began in 1980 (Midshire 1980). The Department has a high research rating with research predominantly centred around new and innovative technology. Teaching is an added strength. The engineers are in management positions and their educational backgrounds range from apprenticeships to first degrees.

Different approaches to critical occasions are evaluated in relation to the contextual framework using a range of texts in the area, focussing in particular on Woods (1993) and Tripp, (1993) who introduce insights into critical episodes on which to build. Each text is in some way incomplete and inconsistent with the other in ways that deserve further consideration in my study. Previous research contains few examples from

Higher Education or Engineering, so this research extends the boundaries of knowledge in this field.

There is a fundamental difference between Woods' interpretation of critical occasions and that offered by Tripp. Woods sees critical events as something of which the individual may be aware at the time. They are milestones in the development of the individuals involved. Tripp propounds an alternative view, that critical incidents are episodes made critical by their subsequent analysis, leading to retrospective awareness. This study seeks to establish if there is a link between these two interpretations.

Issues of memory and cognition are considered to assess their effect on critical incidents, the nature of memory being central to this debate. Discussion of memory type (Chaffee 1990, Rosen 1998) reflects the reconstructive nature of memory, the collective experience of the education received and what influence this may have had on the memory of critical incidents. To use memory effectively, it is helpful to reflect on the issues involved, and critical thinking provides one way forward.

The aims of this study are firstly to consider the nature of critical occasions and their impact on the development of engineers taking a higher degree. Building on this, it captures the personal voices of how one group of such students perceive critical incidents or events during their course. The study investigates issues surrounding the nature of memory in relation to these critical happenings and their impact on embedding the learning from the programme. The research assesses the significance the critical episodes have on the professional development of these individuals and is supported by analysis of the critical occasions described by them. An appreciation of the relationship between cognition, memory and critical incidents is developed using these themes to formulate their relationship to critical events. Finally, individuals' attitudes are considered in relation to elements of change.

The thesis provides an insight into ways of understanding what is happening to the individuals as a result of being on the MSc. programme, including formation, confidence and personal development. What is distinctive about this study is that it draws on student experiences, rather than those of teachers, and attempts to create a framework of critical incidents. Another important facet of this research involves attitudinal issues, which are subjective and difficult to measure. The study examines two educational sub-groups; Graduates and Apprentices, hoping to determine if any attitudinal changes were consistent within and between the educational groupings.

One person I spoke to at the first Doctoral residential at the University of Sheffield told me to 'take from the weekend, that which was relevant [to me], and leave the rest'. For me, that was a critical incident, which 'marked a significant turning-point or change in [my] life' (Tripp 1993:24). What has crossed my mind while preparing this study was whether I saw that statement as a critical incident at the time, or whether it was cognition that prompted the memory?

During the long road to develop this thesis, I have returned to that statement on several occasions. At the time that phrase was just one of many. What made me single it out,

as a critical incident was not apparent at the time? Now, in retrospect, the phrase has had a major impact on my progress through this research. Whether my recollection of the scene is accurate may be the subject of debate, but my current recall of the term has been crucial in achieving thus far. In times of doubt it has provided me with a way forward.

At the other end of the spectrum, a critical phase might be deemed to be the whole Doctor of Education [EdD.] course for me. I have already started to reflect and can see that once it is behind me I will have more opportunities to appreciate the significant changes it has made in my life. Without the ability to think critically and reflect on how I might have done things differently this would be difficult. This example is unlike the brief incident mentioned previously and is more in keeping with Woods' description of critical events as being 'integrated...which may last from a number of weeks to over a year' (1993:2).

Another noteworthy area investigated is the developing professional identity of the informants and how to define the nature of that professionalism. Freidson offers this description of professionalism: 'a set of institutions that permit the members of an occupation to make a living while controlling their own work' (2001:17). If the engineers are to move into managerial positions, with increased control over their actions, 'ongoing development and the diffusion of good practice' (Eraut 1994:41) would be advantageous to them. Issues considered in this research include: whether the professional development of the engineers occurred alongside their MSc., whether any critical incidents were affected by memory, and if so how did this influence professionalism.

My research involves cognition, critical events and professional development. These are areas that suggest they might be of general interest to several domains. Stake identifies 'naturalistic generalisations' (1995:85) as those arrived at through individual involvement with life. Many people can relate to critical events. Therefore it seems probable that something could be learned that is general from this research and subsequently applied in different fields.

1.2 Boundaries of the Research

This thesis builds on a body of knowledge to expand the application of critical happenings by asking the learners to reflect on their own critical episode, and the impact it might have had on their subsequent development. Much education research into critical occasions has been centred round teachers (Woods 1993, Tripp 1993) rather than students. Some studies have included students, but subsequent evaluation has generally been carried out by the researcher. I excluded certain areas because I needed first to identify the issues affecting the students, before considering any subsets such as gender, ethnicity or alternative circumstances.

Building on what has been found in this study, using a larger sample and perhaps a different research methodology could provide a focus for future research. This is one of many alternatives. It might be possible to use a wider sample, a longitudinal sample or a

life history approach to enlarge this research in the future. The research could be applied to different courses within MFG, in the UK and around the world, or it could be applied to other courses in other establishments. I put forward one option, there will be others. I hope merely to stimulate interest and debate in this field.

Another area excluded was researching why some students did not complete their MSc. Using the final taught module as a source of participants, precluded consideration of those students who failed to finish the taught element of the course, or those who completed the taught component but not their dissertation. Were there any critical incidents that prevented them from finishing it? This could have implications for the research findings but the purpose of the study was primarily to identify the positive issues, following Flanagan's (1954) work on the Critical Incident Technique [CIT]. Consideration of people who failed to complete, whilst an interesting area to pursue, was excluded because knowing about the impact of critical incidents on successful students might direct further investigations into why others may have left the course. In a similar vein, work related issues were excluded because this research is focussed on the educational institution, but this could provide a rich source for further exploration.

1.3 Methodology

This case study adopts a reflective approach which may not provide the definitive conclusions that are more usual in engineering. According to Wellington, reflexivity involves 'the self', yet being reflective 'involves thinking critically' (2000:42). While there are elements of both reflectivity and reflexivity throughout my research, I have tried not to indulge in too much 'navel-gazing' (Walford 1998:5).

Adopting a qualitative reflective approach with a group of engineers, encouraged those engineers to develop a deeper sense of their own formation. The engineers were interviewed and asked to reveal their own experiences, to establish if there might be a common set of values relating to critical incidents and to professionalism. Reflection is an 'act of becoming discursive about something that one formerly was little aware of' (Carspecken and MacGillivray 1998:177). All the interviewees were open and responsive, although some admitted that they 'had found it hard' (A7) to be reflective. This suggests that the reflective approach adopted for this research could be a useful area for future development of the programme. By encouraging reflection, these students were able to improve their critical thinking skills.

A contextual framework was developed to gain an insight into understanding of critical incidents and their place in the research setting. This framework was used to support a case study approach (Denscombe 1998) involving twenty-three students approaching the final year of their MSc. One student who had not yet completed all of his modules was also interviewed to provide a further viewpoint. Interviews 'may provide data on understandings, opinions, what people remember doing, attitudes, feelings and the like that people have in common' (Arksey and Knight 1999:2). Since I was researching memories and attitudes, interviews were a suitable approach. Using semi-structured

interviews gave the informants the opportunity to develop answers they deemed relevant (Burgess 1984:102) and allowed me to probe more deeply on occasion.

The individual interviews were followed by a focus group held with the last cohort of the academic year to provide some triangulation to the study. Documentary evidence provided additional corroboration of the experiences of the study group. Interviews with senior academic and other members of staff took place throughout the investigation.

Individuals who took part in the case study had dissimilar experiences resulting from the different modules they attended whilst doing the MSc. Where individuals had taken the same module, perceptions based on their personal constructs were diverse. Personal constructs are 'the dimensions that we use to conceptualise aspects of our day-to-day world' (Cohen and Manion 1994:299). The variety of participants in this study had a commonality of experience, which according to Bryman (1988) strengthens the results.

The fieldwork was analysed following the chronological order of the interview schedule. The first analytical chapter sets the scene, distinguishing between the two main groups of students. The second chapter reviews the variety of critical instances offered by the interviewees, and allocates these episodes to different types of critical occasions identified in the contextual framework. The third section of the fieldwork reflected on what impact these critical events had on the professional development of the students. From this analysis I have developed a rudimentary classification of critical occasions, on which to build in future.

1.4 Outline of the Chapters

Chapter 2 explains and justifies the methodological approach utilized in this study. It considers the methods employed and reviews possible alternative approaches. It explores my research journey and discusses the nature of this case study and its boundaries. It describes the nature of the interview process, the pilot study and the focus group, together with the effect of possible bias such as access, and my own positionality. Finally it details the data analysis process and use of fuzzy logic in my research.

Chapter 3 provides the contextual framework underpinning this study. It has three main topics: professions, professionalism and professionalisation; cognition, learning and memory; and critical occasions. The first section explores issues surrounding the definition of each of these terms in relation to educators and engineers. My own position in this much contested arena is also examined. The second section evaluates how people learn, what determines cognition and describes different types of memory in relation to critical thinking. The last section of this chapter draws on previous work describing critical occasions, taken from a range of different fields.

Chapter 4 describes the university setting on which this case study is founded. It offers some background about the university itself, its origins and strategy. It provides an insight into how MFG has developed and a glimpse of how a module operates, from both the tutors' and the students' perspective.

Chapters 5, 6 and 7 comprise the main body of the thesis. The volume and richness of the interview data meant that the resulting fieldwork analysis and discussion has been spread over three chapters. Chapter 5 identifies the two main educational subsets of Apprentices and Graduates within the study group. It considers the students' educational and industrial background and explores their attitudes to the programme. It highlights differences between the two groups at the start of their course. It examines the mobility and attitude to risk-taking of each group, finally discussing the module choices made by participants.

Chapter 6 analyses critical occasions put forward by participants and positions them within the contextual framework previously discussed in chapter 3. It follows a focus from the previous chapter relating to attitudes, examining how the participants have changed. Chapter 7 draws some threads together from the previous two chapters. It assesses the impact of the educational experience offered by MFG including Post Module Assignments [PMAs] and the critical occasions already described, to establish attitudinal changes and the effect on their professional development.

The final chapter, Chapter 8, reviews and reflects on the fieldwork analysis and presents the conclusions of this research. The critical occasions identified in Chapter 6 are evaluated to suggest an outline framework. Attitudinal changes of the two sub-groups are compared and related to their growing confidence and professional development. Finally, recommendations of areas for future research are made.

1.5 Summary

This student-centred research offers an insight into a unique post-experience centre in the United Kingdom by examining critical episodes depicted by respondents. It contributes to an understanding of education by identifying what specific events these engineers deemed had a decisive impact on their educational and professional development. It elaborates a typology of critical occasions that may be developed in future research, either at MFG or elsewhere. The study details ways in which cognition, learning and memory interplay with these significant events and considers the effect the course has on these students as individuals and how it enables them to operate as change agents within the workplace.

The Finniston Report, Engineering Our Future, reviewed the requirements of manufacturing industry 'in the light of economic needs' (1980:1) to determine the role for professional and technician engineers, and the role of the engineering institutions in their education. Finniston recommended an integrative teaching model offering industrial and academic dimensions and MFG has drawn some inspiration from that type of approach. This study is a micro-scale discussion of a community that was influenced by the climate of that time. The research is trying to see from the voices of the students how far this has been achieved.

CHAPTER TWO

2 Methodology

In this chapter I depict my journey towards this thesis, together with the boundaries and reasoning behind my research methodology. This research is centred round a cohort of students taking an MSc. in one centre, which is the case study. I have included ethical and access issues about working in one's own Institution, indicated how I selected my research sample and described the dilemmas I faced in reaching that selection. I have also debated issues about the structure and content of my interviews.

I identify the framework within which this investigation is located. I also describe the pilot study and its implications for the remainder of my study and I delineate how I conducted the main interviews. This is followed by an outline of the data analysis process and includes a synopsis of how the fieldwork chapters were analysed, supported by a discussion of fuzzy logic and its implications for this research.

Inevitably I have put a personal perspective on this process. I demonstrate that my position has shifted (Merriam et al. 2001:411) during the course of this investigation. I do not set out to suggest this as the only way of conducting this research but I have tried to support the, sometimes reflexive, decisions I have made as being a reasoned way forward.

2.1 The Research Journey

In this section I explain the process undergone to arrive at my research proposal and outline the approach adopted in achieving this thesis. My research journey has been tortuous. I began my EdD. at Sheffield following the management pathway, with a particular interest in the management of change. My initial proposal involved how MFG created individual change agents. Preparing an outline research plan made me appreciate that there are boundaries and limitations in any research proposal, and my initial longitudinal plans were too ambitious, both in terms of scale and time available.

My first proposal had positivist inclinations that matched my background and training. I had hoped to identify a causal relationship between critical events and student achievements. Schon's opinion on 'professional knowledge as the application of scientific theory and technique to the instrumental problems of practice' (1983:30) seemed relevant to me. During the EdD. my wider appreciation of alternative paradigms led me to narrow my research.

The next iteration of my proposal placed more emphasis on change, but within a narrower frame, in terms of both what constituted change and time-scale. The resulting outline considered how learning is embedded during the life of an MSc. student. Again this proved to be too wide. A subsidiary question of this second proposal had been to consider critical occasions, as a pivotal point around which change might occur. This has provided my research focus, but always with an anchor within the field of professionalism.

My interest in critical happenings developed from how knowledge is located in the advancement of professional engineers. When I moved to my current post, presentation of teaching materials, and as a result the learning process (Brookfield and Preskill 1999:24), was very different from teaching students for professional accountancy examinations. I was curious about how students learn. My quest was to see what impact critical occasions and memory have on learning, so memory forms another strand to this study:

> *Memory is a process, by means of which the meanings of then become the meanings of now.... Memory is not a thing but an activity, not so much what we have as what we do. (Rosen 1998:102)*

To support the study I used a variety of primary source documents (Arksey and Knight 1999:164). I consulted the original documentation used to establish MFG (Midshire 1980) in May 2001. Some of this documentation was archived institutional records, rather than policy documents. These sources were used to confirm the fieldwork and hence provide a different viewpoint. My research has similarities with Hegarty's (2001) study. Both are located in Higher Education. Hegarty used documents as his primary source with supporting interviews, whereas I have used interviews as my primary source, with documents providing secondary data.

I had access to student academic records. These historical and contemporary (Delamont 1992:105) papers underpin the foundations of this research and offer an institutional view of the study. In addition I obtained biographical details of the respondents, which I used as confirmation of their interview accounts as relevant. Using Wellington's (2000:112) typology access to these internal documents was restricted. I used both these documentary sources to confirm information obtained during the fieldwork to increase reliability (Scott 1990:3) but was aware of the limitation that documents can be viewed as 'socially produced' (Delamont 1992:104). Other documentary sources include using books, journals and conference papers identified from library and electronic resources, with occasional forays into the World Wide Web.

My literature search occurred throughout the data gathering and analysis period (Hart 1998). As I identified possible literature sources I created a spreadsheet (Brause 2000:114) including library details, an indication where the source might be relevant together with the primary reference source so that I could maintain an audit trail. I found a large amount of relevant literature, much of it recent, but with some early roots.

I interviewed twenty-four students between December 2000 and October 2001 and held a focus group in June 2001. During this period my interview technique improved (Arksey and Knight 1999:107) and as I transcribed interviews further lines of questioning emerged. Later interviewees were asked more searching questions as my confidence and knowledge of the subject became deeper. I interviewed the Academic Director of Graduate Studies [ADGS] in September 2000, the Director of Industrial Programmes [DIP] in June 2002 and the Programme Manager Industrial Programmes

[PMIP] in December 2002. There were also several corridor conversations throughout the research period.

2.2 Case Study Boundaries

Here I deliberate my choice of a case study, and how I defined the boundaries to the research. There has been considerable debate as to what makes a case study (e.g. Kemmis 1980, Bogdan and Biklen 1982, Bassey 1999). According to Stake a case is 'an integrated system...that has a boundary and working parts' (1995:2). In his opinion a case can be 'an innovative program' (ibid.), while Simons suggests that 'by studying the uniqueness of the particular, we come to understand the universal' (1996:231). MFG's uniqueness fits both these descriptions well. The historical background documentation I used supports 'the contemporary scene' (Wellington 1996:40) of MFG and its students accurately.

This single case study belongs in the instrumental category being one that is 'expected to advance our understanding of' (Stake 1994:237) critical events in relation to the professional development of engineers. However Stake does provide a caveat regarding the lack of a clear division between instrumental and intrinsic case studies by indicating that the distinction between the two is a 'zone of combined purpose' (ibid.). There seems an element of overlap with fuzzy logic here.

This study adopts a reflective stance (Wellington 2000:42) whereby respondents were asked to reflect on some of their own issues and the reflexive nature of these events on their lives. I in turn have reflected on what was told to me at several different levels using the 'complex relationship between processes of knowledge production...as well as the involvement of the knowledge producer' (Alvesson and Skoldberg 2000:5). Stake prefers the term interpretive 'to emphasise the production of meanings' (1998:99), while Denzin sees interpretive as helping to 'identify different definitions of the problem' (1989:11) being studied. I would argue that it is necessary first to be reflective before any interpretation can begin.

I decided to use Midshire for my research because of time and accessibility (Potts 2000:377), but was conscious that over-familiarity might distort certain issues (Frain 1993) and could not be overlooked. Ethical considerations surrounding conducting research in one's own Institution are important particularly where research is not the norm. MFG has a culture with an Asian influence, and an enigmatic Professor.

Culture has been described as meaning 'the shared orientations, norms and values that characterise staff activity' (Frain 1993:160) while Stenhouse viewed culture as 'a shared store of complex understandings between mind and mind' (1967:53). To access these shared standards it is necessary first to understand them (Geertz 1973:452). This was true of the open plan office in which I work, where staff members from education represented the minority. The model adopted by MFG has no link with the 'creeping vocationalisation and subordination of learning to the dictates of the market' (Giroux and Myrsiades 2001:34). MFG involves businesses in developing module content, and

attempts to create adaptable managers capable of change, but there the comparison with Giroux and Myrsiades ends.

Central to this research is the tenet that during the life of a student there may have been one or more critical occasions that have helped to embed learning from the MSc. in such a way that the whole programme encompasses more than the sum (Hughes 1998:109) of the individual parts. Case study design needs to give consideration to the hypothesis being tested (Yin, 1993), which here is situated within the development and cognition of the engineering professional. When determining the boundaries I considered which students I would interview and over what time-scale.

It seemed logical to use the group that could provide the greatest diversity of background and experience to enhance my research, which is the part-time MSc. in EBM; but I needed to consider alternatives. One possibility was whether to include overseas participants. These students are from different companies and also attend modules in part-time mode. One way of validation (Hammersley 1987:77) was to include some in my sample, enabling comparison across two different cohorts. Modules overseas have a slightly different format, and possible cultural differences might make comparison invalid. Therefore I decided this was not viable.

Alternatively I could widen the study in the UK to include delegates attending other MFG courses. Again I ruled this out. Full-time students are usually self-funded, frequently from overseas and rarely have much work experience. I could have included students from company specific programmes but thought this inappropriate because participants follow a prescribed route, as a group, through their modules. I deemed that group dynamics could distort the results. Therefore the sample was selected from UK participants taking the Integrated Graduate Development Scheme [IGDS] MSc.

My next consideration was at what stage in the course participants should have reached for them to be able to identify if and when critical instances may have occurred. Participants at the start of their course might have difficulty in identifying critical happenings. One option was to select a sample part way through the course and to follow their progress. Again I felt that time limitations restricted the level of detail obtainable from such a sample.

The sample selected was based on delegates who had completed most of their chosen modules. They were familiar with the MFG process, were able to make observations on a range of different modules, and may have been exposed to research questions from fellow participants during their course. A longitudinal approach to the study was ruled out, partly because of the time scale, although as Bryman (1988) suggests there was a longitudinal element in-built because of the time taken for me to complete the interviews.

I have drawn encouragement from previous EdD. theses (e.g. Dunseath 1999, Allies 2000). In particular my study has parallels with Hegarty (2001). Hegarty's research entailed a single case detailing raising culinary arts to degree level. It encompasses issues of professionalism, and the development of reflective teachers and students, as

does my research. Whilst at first sight there may be little comparison between cooking and engineers, both fields face the challenge of raising their professional profile in part associated with the 'vocational debate' (Hegarty 2001:8).

2.3 Approach and Method

In this section I review some alternative methodological approaches and indicate my reasons for those selected. Burgess suggests 'using appropriate techniques' (1984:191) to make the research criteria clear to participants at the outset. The Association of Chartered Certified Accountants [ACCA] requires members to 'behave with integrity in all professional... relationships' and adds that we should 'strive for objectivity' which is a 'state of mind' (2003: 303). Membership of the ACCA requires that I abide by such rules and regulations that are extant, so participants had some assurance about confidentiality. In a similar vein in America the National Society of Professional Engineers requires that engineers shall 'hold paramount... [public safety] in the performance of their professional duties' (Whitbeck 1998:38).

Various approaches were open to me. Using a quantitative approach 'measures the reactions of a great many people to a limited set of questions' (Patton 1990:14) and lend themselves to 'generalised ...findings' (ibid.) I make no great claim to generalisations. Surveys are a common form of quantitative method. They are appropriate where data are collected about a particular set of circumstances or at a given point in time. They lend themselves to computer analysis and have the strength of having large databases from which to draw conclusions (Anderson and Arsenault 1998:165). I did have access to sufficient numbers of students to carry out a survey, but considered a survey was inappropriate. Participant discussion of critical incidents requires reflection, which might be difficult to achieve using a survey. Survey techniques would not provide the 'deeper understanding of social phenomena' (Silverman 2000:8) that I was looking for.

MFG maintains a comprehensive database of students. One possibility was that a questionnaire might be used, since there is a large number of students included in this database. This would have the advantage of quantity, but not necessarily of quality. Questionnaires are better at 'checking how far the hypothesis ... is shared by the sample' (Arksey & Knight 1999:34). Using questionnaires would offer little opportunity to recheck or confirm an answer, something I believed was essential for my research. Interviews are carried out in 'real-time' allowing the interviewer to 'follow up ideas, probe responses and investigate motives and feelings, which a questionnaire can never do' (Bell 1993:91).

There have been many claims about the power of interviews (Arksey and Knight 1999:32). They allow a richness of response, can explore issues from the respondents' perspective and allow a dialogue between researcher and respondent. I hoped to discover individual examples that benefit from using interviews. Criticisms of interviews include sensitivity to nuances of expression and commonality of understanding of terminology (Bryman 1988:114). I chose to use interviews because they allowed flexibility to build on areas raised by participants at the time, not post hoc.

Undoubtedly I achieved more from later interviews as I grew in confidence, but even the early ones provided a rich tapestry of information.

Another possible approach would have been to use life histories. Goodson writes that 'life history is the life story located within it's historical context' (1992:6). This style of research has increased in status in recent years (Sikes, Measor and Woods 1985, Rosen 1998, Allies 2000) and as Goodson and Sikes argue 'can be used effectively to provide data on practically every social issue' (2001:21). Life history interviews are time consuming (Delamont 1992:108), and on balance I felt that deeper study of fewer participants, although offering a different perspective, would not provide the breadth of examples I anticipated. I needed a larger sample size than using life cycle respondents to achieve a rudimentary classification of critical occasions.

Life histories did meet my initial objectives, but were not used because as an exploratory study life histories would not provide 'the what kind' (Goodson and Sikes 2001:22) of answer I was searching for. Life histories might widen the scope of the research to include areas of the participants' lives outside the initial boundaries which could have distracted from the original purpose. They do suggest a potential research area for the future.

There might have been an ethical issue of control. An unequal power relationship between students and my combined role as module tutor and researcher 'does not necessarily constitute a problem as such.... Anyone in a position of power can choose not to exercise it, to limit or delegate it' (Tripp 1998:47). In view of the strong influence of my professional body and its requirements regarding professional integrity, I chose not to use one of my own modules as a source of participants. Glen describes Polonius' notion of integrity as 'being true to oneself. Integrity here is associated with personal ideals or conviction' (Glen 2000:13).

I selected my sample from a compulsory module, Business Policy and Strategic Management [BP&SM], to reduce the possibility of bias. Students take this module near the end of the modular stage of the course. I hoped to get a sample that would both 'contribute to and constrain' (Simons 2000:39) what could be achieved realistically. BP&SM runs several times a year and therefore fitted my time-scale. Using participants taking this module provided a representative sample, but left it open to bias due to the comparatively short time-scale involved. I compared the sample with the student database, providing some triangulation (Cohen and Manion 1994:233, Huberman and Miles 1998:199).

Some participants work in commercially sensitive areas, and some are required to sign the Official Secrets Act. The ACCA requires its members to 'respect the confidential nature of the information they obtain' (2003:439). My initial request for participants emphasised that the study would be confidential and that the DIP had endorsed my research (July 2000). Confidentiality would encompass retention and maintenance of records as well as dissemination of the results (Street 1998:152). This reduced concern regarding access to students as outlined by Burgess (1984:38).

My presentation early in the module allowed delegates who might not wish to contribute or who felt negatively towards the MSc. programme to reflect on these issues, before deciding whether to participate. Jenkins (1984) outlined this uneasy relationship between sponsor, researcher and participant when describing the tensions behind the differing expected outcomes from ethnographic research in Northern Ireland. No-one declined to participate.

2.4 The Interviews

This section identifies the issues surrounding interviews: types, access, ethics and reliability. Interviews are widely used in social and educational research (Burgess 1984:101). Stenhouse suggested that interviews provide 'evidence rather than...data' (1993:89) in the scientific form and offer 'naturally expressed information' (ibid:90) facilitating critical analysis. The interactive nature and flexibility of interviews provide a means of focussing on important issues. Students might offer detailed examples relating to critical occasions, using interviews enabled me to elaborate specific points and digress into areas I had not initially considered, but which might offer supplementary insights.

I considered the research questions might be too complex to compress (Denscombe 1998:112) into a structured interview. By using semi-structured interviews I had a 'frame of reference...for respondents' answers...but put a minimum of restraint' (Kerlinger 2000:695) on interviewees. Reading continued throughout the research period. I needed an 'appreciation ...of the topic' (Breakwell, Hammond and Fife-Schaw 1995:241) prior to conducting the interviews to be able to respond to developing situations.

This research draws on three main areas: cognition, critical incidents and professionalism. Investigating these issues needed an approach that allowed me to change interview track as necessary as the interviews moved in different directions. Therefore I used semi-structured, one–to–one interviews. This allowed questions to be asked in a logical order, but provided flexibility for the informant to respond freely.

Researching in one's own institution raises the question of whether interviewees are giving the answer they expect you want from the interview questions because you know them (Burgess 1982:1). Sikes (2000:264) touches on the nature of memory in relation to whether informants are telling the 'truth' as in – what they think researchers want to hear, or, how the informant has chosen to remember and describe an incident. I needed to allow for participants doing just this when they responded to my interview questions. I expected events recalled by interviewees would be autobiographical and therefore there should be no reason for them to conceal the truth. I hoped that when respondents described their critical happening, articulating such events held in their memory might 'turn [them] into autobiographical text' (Rosen 1998:99).

The interview schedule (Appendix 1) included seven benchmark questions (Arksey and Knight 1999:85), each with supplementary areas for further discussion. This provided sufficient depth of detail without making the interview too long, whilst ensuring I did

not outstay my welcome. To minimise 'misrepresentation and misunderstanding' (Stake 1995:109) participants received my interview guide a few days before our meeting. I anticipated that the interview schedule would jog memories prior to my interview, and encourage reflection since 'reflective practitioners need reflective clients' (Altrichter 1993:52).

The secondary interview prompts included some closed questions, to constrain the interview. If respondents had critical incidents to recount, they might be very different in nature depending on the individual and the context. The variety of my secondary prompts allowed for some unpredictability. The questions followed a pattern of introductory general questions; deeper more insightful questions; probing questions and ending with an open question allowing the informant to introduce other relevant issues.

My first question was intended to put the interviewee at ease, and provide an insight into their education and working life prior to starting the MSc. Then I began probing their memories by asking a question about module choice; to remind them about the beginning of the course and to develop our relationship. My second question was used to build on the rapport I had established during the first question. It was intended to kick-start respondents' memory retrieval, allowing time for underlying recollections to be brought to the surface.

The next section of the interview asked participants to reflect if there had been a critical occasion during the course that had influenced their development. To underpin this question I provided respondents with descriptions of two different critical occasions from key texts, Tripp (1993) and Woods (1993). My purpose was to encourage openness within the confines of the interview and by giving examples I wanted to jog their memories prior to our meeting.

I gave interviewees an example from one of my pilot interviews as something they could relate to. The example was a 'flashbulb' incident when a tutor had explained the meaning of 'order winners and order qualifiers' (P1). P1 continued: 'a whole lot of things then fell into place' (September 2000). This was a clear example of Tripp's (1993) 'critical incident', but without the relevant knowledge and the time to reflect, P1 might not have been able to link the associated issues together. Offering this model broke the ice, and provided participants with an awareness of critical occasions.

Then I asked delegates if their attitude to the course had changed, an open question allowing different reasons for attitude changes to emerge. This enabled participants to think more widely than had been expected with earlier questions. My purpose here was to encourage empathy and openness amongst participants. I hoped any changes in attitude would flow from the critical occasions previously discussed.

The next question asked respondents to recall expectations about knowledge assimilation at the start of the course and how it had changed. Critical occasions or attitude changes might have impacted on answers to this question. I put this reflective question in here because interviewees should be more relaxed and willing to respond. My purpose was to elucidate any relevant attitudinal issues. My last formal question

asked about developmental changes either in attitude, peer group or professionalism and was used to identify the changes resulting from taking the course.

Reliability of informants' descriptions depended on their honesty and integrity. Deliberate misinforming by respondents seemed unlikely. They had no need to 'hide' any information but this could not be ruled out. I tried to ensure that no informant told any 'lies' as described by Sikes (2000:260, Alasuutari 1995) by checking with academic records, industrial and academic supervisors. MSc. participants, from the first day of the course, are encouraged to be open within the confines of the lecture room. Participants gain as much from each other as from the tutors, and issues of confidentiality are emphasised from the beginning.

At the end of the interviews, I checked that I would be able to confirm or clarify any issues as necessary. Referring interview details back to respondents for confirmation acted as a 'control effect' (Riley 1963:559) both at the time of interview and when the transcript was returned to the interviewee. Checking my interpretation with the individual after the analysis lends credence (Wellington 2000:25) to this process. No-one refused my request for verification.

In my opinion reflection is essential to this research. The delay between the interview and returning the transcripts to participants allowed them time to reflect and perhaps alter emphasis in places. Silverman tempers returning transcriptions suggesting that evidence gained must be tested from all possible perspectives to avoid 'the temptation to jump to easy conclusions' (2000:178). Having created lines of communication with participants at the interview I was able to follow up interesting lines of inquiry.

2.5 The Pilot Study

The pilot study took place between September and December 2000. For the pilot study I interviewed a former student who is now a member of staff. Her interview was transcribed and returned for confirmation of content. I also interviewed two former students I had supervised by email. I had been in a position to influence these two graduates but now their studies were complete, I no longer had that power. If there was an issue of power here, it can be balanced by Boshier (1990:51) who described email as 'non-coercive and anti-hierarchical...free of internal or external coercion'. Selwyn and Robson however point out that email, whilst accurate, may lack 'valuable, non-verbal data' (1998:3). I judged that I gained from the equality of email, but also benefited from my first hand knowledge of these informants.

The email interviews were 'conversations' rather than using abridged text (Boshier 1990:57). Sometimes I found it difficult to obtain a rapid response from my subjects. They are busy people. On reflection I had been tentative in my approaches to these informants. I found the process of using email for my pilot study had not run smoothly; therefore I decided to conduct face-to-face interviews wherever possible.

I used the pilot phase to identify areas that might be unclear and to practice what I hoped would be 'effective communication patterns' (Janesick 1998:42). After the pilot

phase the interview schedule was reviewed for anything capable of misinterpretation. Respondents were asked if problems had been linguistic or contextual and the interview guide changed accordingly, to improve data integrity.

2.6 Conducting the Interviews

I requested participation from each group on the first day of the BP & SM modules that ran between September 2000 and March 2001. I began with an outline of the area being researched to support my investigation (Appendix 2). I was careful to ensure delegates were aware of my background, what I was hoping to achieve and what the study limitations would be, to increase the credibility (Hedrick, Bickman and Rog, 1993:35) of my stance. I returned to the group on the last day of the module to answer questions, and arrange if and when it was possible to interview them. This gave the students an opportunity to contemplate during the week if they did not wish to participate. No-one refused to be interviewed.

I sent the primary questions to the informants a few days beforehand allowing them time to reflect. To improve the data quality I wanted my interviewees to have time to reflect on my questions, since its primary stance was reflective. If respondents had little time to mull over my questions I thought I might receive ill-considered responses. Since the interview schedule would act as a reminder (Tolman 1987:203), critical occasions are not necessarily 'at the front of the mind' (Arksey & Knight 1999:85) and there could be issues surrounding events that the respondent might need to categorise (Bruner, Goodnow and Austin 1986:231, Schratz and Walker 1995:42).

For me, the initial meeting with delegates during BP & SM was an opportunity to initiate trust in an 'honest project' (Woods 1986:29). Delegates were far enough through their MSc. to appreciate whether what I was hoping to achieve in my research was possible, based on their first thoughts on critical incidents. It provided an element of informed consent, which in turn facilitated access. As I made my presentation to each group my confidence increased and more interaction developed. This encouraged deeper reflection by participants in the interval between my initial request for volunteers and their interview.

Porter (1984) emphasises the difficulties of accessibility to postgraduate students working in Universities throughout the UK as being haphazard, and controlled by their supervisors. My participants were all managers, and able to control their working environment, so they acted as informant and gatekeeper (Burgess 1984). Those I could not meet at Midshire, I visited at work.

Trust was established, at the beginning by being open and honest in my initial request for participation. Walker describes trust as the need to gain acceptance by all groups involved: delegates, industrial supervisors and colleagues; without being 'captured by any one interest or group' (1980:49). At the beginning and end of each interview I reiterated the research aims (Anderson and Arsenault 1998:197), and a reminder about confidentiality.

Reactions to my research by participants might have been cynical. Engineering research is rooted in science. For engineers to be faced with qualitative research is anathema to some, which Bryman describes as 'reactivity' (1988:112). I resolved this by maintaining a professional stance at all times. I saw it as an opportunity to raise the profile of qualitative research.

I tape-recorded each interview 'providing a [formal] record' (Silverman 2001:162) of my research. On three occasions the quality of my recording was poor. One interview took place in a pub car park; one within a manufacturing facility with attendant loudspeaker announcements and the third was difficult to hear because of resonance from the tape-recorder. I found the recordings a source of rich data and frequent repetition of tapes whilst transcribing helped to imprint the sounds in my memory. In addition, field notes were taken at the time of the interview to act as an aide-memoir and increase objective validity (Carspecken & MacGillivray 1998:182).

Two students were based in Northern Ireland. I had little opportunity of combining a site-visit with work commitments or visiting other students. These participants were interviewed by email. One further interviewee, based in Hull, agreed to respond by tape, but after some prompting gave me a written response. This I included in my fieldwork analysis.

After completing the interviews I discussed my preliminary findings with the focus group. I requested participation early in the module in the same way I had asked for interviewees. The focus group took place at the end of the module when a group identity had developed; and the formal module content was complete. I felt this would encourage openness, sharing of views and 'mining' (Lederman 1990:118) of information. It added an extra dimension to my research by encouraging 'greater openness...through interaction with others' (Vaughn, Schumm and Sinagub 1996:18). The focus group identified our meeting as a highlight of their module, suggesting that reflection should be encouraged.

I used the focus group to clarify (Anderson and Arsenault 1998:200) my preliminary findings and to corroborate the results. I have included some anecdotes in my fieldwork discussion. I hoped that a range of opinions might emerge which could spark additional attitudes and opinions (Byers and Wilcox 1988:5) that might 'act as a catalyst in drawing out further reflection' (Anderson, Herr and Nihlen 1994:83). I prepared for the focus group in a way similar to the interviews by preparing a 'moderator guide' (Greenbaum 2000:84).

2.7 Data Analysis

Using the pilot study to establish a system, I built up a 'systematic, coherent process of data collection, storage, and retrieval' (Huberman and Miles 1998:180) relating to each individual, to ease the retrieval process. This included the biographic details completed at my initial interview request. Tape recordings of interviews were kept in date of interview order, facilitating the process of following themes emerging from the data. To

provide a base from which to analyse the data, a case study database was created, with the intention of avoiding being 'underdocumented and overconcluded' (Yin 1992:132). This provided the basis from which the preliminary results were determined, and was used in the focus group discussion. The analysis identified 'recurrent patterns of social interaction and language use' (Perakyla 1997:202) and was one way of increasing reliability.

For reasons of time, I transcribed two-thirds of the interviews using broad transcription methods to highlight the content of the message, rather than nuances of language. I listened to the remaining tapes carefully, marking key points for inclusion in my analysis. Some of the secondary data from the interviews were outside the main 'framework' (Alasuutari 1995:111) and some of it was not part of the public field notes (Hull 1985:29).

Familiarity was by constant listening and reading of the transcripts. I have a long journey to work allowing me to listen to one interview each journey and enabling me to develop a feel for my data. Wellington (2000:134) describes this as immersion in the data. I began the process of making connections where none is immediately obvious (Alvesson and Skoldberg 2000:295). I anticipated informants would have stories to tell, but what was important to my research was that these stories provided a pivotal point in their learning.

I wanted to position the data within the general framework of critical events. I did this by coding (Coffey and Atkinson 1996:29), labelling, selection and summary (Blaxter, Hughes and Tight 1996:184) before applying the last method suggested by Bloom and Fischer's framework; that of 'proportion / frequency' (1982:464) as confirmation. The main purpose was to study the data from as many different perspectives as possible to ensure that no major theme or aspect was neglected, described by Wellington (2000:136) as recombining or synthesising data.

The categories I identified were based on *a priori* ideas derived from the contextual framework, and were reviewed constantly throughout the analytical stage. I then tested these further with the focus group. Searching for new meanings involves both 'direct interpretation of the individual instance and through aggregation of instances' (Stake 1995:74). This research relied on using both these techniques, but placing the pivotal incidents into critical categories was my own interpretation and I adopted fuzzy logic as an approach.

I discounted using a computer package to analyse the data for several reasons. Time and cost were factors. Time was short. The expected learning curve needed to use a computer package well was more fundamental. My finance background came into play in this decision. I teach basic financial skills without using spreadsheets because understanding is necessary to appreciate what the spreadsheet is doing. I saw no reason why it should be any different for my data analysis. Computers may help or 'improve on, the ways we construct and test' but there needs to be 'explicit formulation of theory' (Richards and Richards 1998:220) the responsibility for which was mine alone.

After some false starts I analysed the fieldwork in the order of interview question, 'grouping concepts into categories...to reduce the number of units' (Strauss and Corbin 1998:113) and made the data manageable. The first two questions provided participant background and a way of grouping the respondents so that attitudinal differentiation came across well. The resultant grouping was primarily those with, or without, a first degree. I called the groups 'Apprentices' and 'Graduates', and allocated each person a number following the order of the interview: A1, A2, G1, G2. The two people with no formal qualifications on leaving school I have included in the Apprentice group, but have distinguished them by allocated them the numbers 21, and 22. This group division, in the first instance made the data manageable, and then provided an interesting insight into the different educational backgrounds.

In the second fieldwork chapter I associated the critical occasions offered with those identified in the literature. I applied reflexivity to the descriptions provided by respondents. By that I mean the process of interpreting narratives that reflect existing ways of interpretation described by Clegg and Hardy (1996:4). My classification is one possibility; there may be others.

The third fieldwork chapter builds on the themes of PMAs and attitudinal issues to demonstrate an emerging sense of professionalism. This is based on participant experience and increased confidence during the course. The data collected from the focus group session were incorporated into my 'pre-determined categories' (Lederman 1990:124) that had been framed within the 'key idea' as described by Vaughn, Schumm & Sinagub (1996:102) using the coding system for participants [F1, F2] as before.

2.8 Fuzzy Logic

Data reliability includes consistency of data analysis which fits within the positivist thinking of 'universalistic laws'; but real episodes also can be explained in a 'deductive fashion' (Altheide & Johnson 1994:487). Hammersley (1987:78) points out that uniformity of results are dependent on accuracy of measurement. The fuzzy principle states that 'everything is a matter of degree' (Kosko 1994:18). In my view using fuzzy logic increases the likelihood of reliability.

Fuzzy logic incorporates two meanings. One is based on the concept of a fuzzy set, 'that is, a "class" with a continuum, of grades of membership' (Zadeh 1965:339). This meaning leads to fuzzy generalisations as depicted by Bassey 'where particular events *may* lead to particular consequences' (2001:2). The alternative meaning is based on an extension of Boolean algebra (Nguyen and Walker 1999:61). This developed from neural networks, which apply to human brains (Kartalopoulos 1996: xvii) as well as computers.

Bassey has changed his views of 'fuzzy generalisation' since he first debated them in 1981. In his early writing he argued against generalisations in favour of studying single events (1981:86), that Simons called 'singularities' (1980). He portrayed closed generalisations as a description of the known, while an open generalisation was 'descriptive of both the known and predictive of the unknown' (Bassey 1995:98). His

current view is that it is possible to 'formulate outcomes of empirical research as fuzzy generalisations' (2001:1) in such a way that they may be useful to teachers and practitioners.

In the West the 'term fuzzy carries negative connotations' (Ross 1995:3) whereas it is acceptable in Asian cultures. An example of fuzzy thinking involves how an apple changes from being an apple – to not being an apple as it is eaten, through what Kosko describes as being a 'nonthing' (Kosko 1994:4). Fourali describes fuzzy logic as being helpful when examining issues that do not involve 'an either /or decision' and which allow opinions to be expressed in more flexible ways' making 'decisions more valid and credible' (1997:145).

If certain factors can be measured precisely, others cannot be measured so precisely. Lukasiewicz (1929:11) analysed this indeterminate ground into multi-valued, or multi-valence. He conceived the idea of a spectrum from true to false. Using Kosko's (1994:18) fuzzy principle the reliability of my results fits in well with Heisenberg's uncertainty principle (Reason 1994:11) where multi-values become important.

Fuzzy sets do not lack clarity but epitomise the 'lack of crispness' (Yan 1994:1) of many situations. Yan suggests that careful choice of language can define these examples. Kartalopoulos identifies 'phrases like "see you later" and "a little more"' (1996: xxi) as fuzzy. The fuzziness arises from the different connotations given to these terms when used by, for example, electronic engineers and archaeologists. Fuzzy thinking has been applied to the data generated to see if any fuzzy generalisations (Bassey 2001:9) can be drawn This 'reflexivity' required me to ensure that no one aspect was allowed to 'dominate' over others 'avoiding empiricism and narcissism' (Alvesson and Skoldberg 2000:246).

Analysis of the interviews produced a wide spectrum of critical occasions. The results generated a continuum of definitions that were used to introduce a framework of critical incidents. The generalisability of these results is evident from their applicability to other fields, and institutions.

Evaluation of the information generated resulted in making judgements. Yin considers evaluation to be assessment and explanation of 'action projects or programmes, operated in any variety of real-life, field settings' (1992:121). This evaluation incorporates the processes and outcomes of the MSc. programme. So fuzziness, or the scientific term multi-valence, provides an explanation for the range of critical occasions which emerge from analysing the information offered by the respondents.

2.9 Summary

In this chapter I have elucidated and justified my methodological approach, which is mainly qualitative with quantitative elements. I have explained the basis of selecting the participants and how the interviews were conducted. The primary data are supported by the use of primary and secondary documentary sources.

The resulting analysis established commonalities in the data that highlighted attitudinal differences between my primary groups. What became clear as the analysis progressed was that the critical occasions described by respondents matched the existing contextual framework well, encouraging me to move towards a classification of critical incidents using fuzzy logic to underpin its construction. My own ontological perspective emerges in places but I hope the perspective I offer is reasonable and realistic.

CHAPTER THREE

3 Critical Issues

In this chapter I review theoretical issues relating to my study, providing a framework against which the critical occasions of respondents can be debated. In writing this chapter I have drawn on different subject areas. There are three main themes targeting issues that will be explored in the research fieldwork. The first area debates professions, professionalism and professionalisation. This includes discussion about what a profession is and what the meaning of professionalism and professionalisation may be. The chapter moves on to raise theoretical issues from earlier studies surrounding cognition and memory, and how learning is embedded in the minds of students. The final section reviews previous educational research into critical incidents before considering the range of critical occasions described in earlier studies.

3.1 Professions, Professionalism and Professionalisation

This first section debates issues surrounding the ever changing definition of the words profession, professional and professionalism. These terms are widely used in diverse contexts with inconsistent connotations (Helsby 1996, Hoyle 1995) without any clear consensus of meaning. Any study enquiring into the professional development of students should examine this variety to establish appropriate definitions. When I began my EdD., my view of a profession followed that of Byerly Thomson, writing in 1857 of the 'higher professions' as being those 'regulated by law' that were 'defended against unqualified competition' (Reader 1966:149; see also Freidson 1993:56, Eraut 1994:2, and Nixon et al. 1997:12 amongst others). I had long assumed this was a valid and sufficient definition for a profession. My wider reading has made me aware of alternative views and deeper issues.

If I hold myself out to be a member of the ACCA I must abide by its rules and regulations, failure to do so could render me liable for disciplinary action, with the ultimate sanction of removal from membership. The ACCA can be classified as one of the 'learned' professions. It is a 'self-governing body' with a 'written code of ethics' (Hoyle and John 1995:3). This provides clear evidence of the control my professional body has over my actions, but not of my attitudes.

An early enlargement of this 'legal' boundary came from Carr-Saunders and Wilson who regard the 'ancient professions of law and medicine' as providing 'a specialized service to the community' (1933:284), thus widening the scope by adding 'people' to the definition of a profession. Hargrove expands this further by suggesting that 'a profession is a way of life' (1972:25) indicating an all encompassing lifestyle.

Another view comes from Freidson who considers professions to be 'productive trades' the distinguishing features being control of the 'knowledge and skills that set them apart... [and] of commitment and concern' (1984:2) for others in what they do. According to Schon 'the knowledge base of a profession is...specialised, firmly bounded, scientific and standardised' (1983:23); again suggesting that a profession can

be something that includes knowledge as well as social responsibility to others. There is no generally accepted definition of 'profession' but rather a melange of diverse ideologies that are constantly changing.

Another viewpoint places emphasis on the materialist concept of society offered by Marx and Weber. Both writers studied inequalities amongst people, and the impact of structured group action. Marx held that 'in the long run, ideas and institutions are determined by the material conditions under which men work' (Bendix 1974:150). Freidson concurs with this analysis adding that people are not in control of their future, and that division of labour was the result of capitalism, not technological necessity (1994:54). Weber argued that by 'joining organisations [people] would have to sacrifice their personal desires and goals' (Elwell 2003) to those of the business. Both Marx and Weber suggest in their different ways that professions are trying to achieve 'control over a niche within the market for skilled labour' (Willmott 2000:237, Freidson 1994:202).

These views of the perceived power of the 'traditional' professions and the struggles of teaching and engineering towards professionalisation, whilst interesting, have little direct relevance to my discussion of how student learning relates to engineering managers. This research has its locus in the professional development of individual students as they progress through their MSc. It is not about their status, influence or their class location.

All professions may have a claim to be unique, but most professions provide a service to people, for example medicine, education or religion. So what of the engineering profession? Carr-Saunders and Wilson outline the engineering profession as one that applies 'abstract study' to the 'concrete problems' (1933:155) of the everyday world. Following this view Turner considers the engineering profession to be distinctive in that 'the engineer utilises the raw materials of nature, and his acquired laws of nature, to offer products or services that others can use' (1969:3). Recently engineering was described as a profession that is 'highly organised' but whether 'high standards, continued study and public service' (Kemper and Sanders 2001:11) were universally adopted were questioned.

Professional education adopted the 'principle of... apprenticeship, learning by doing' (Reader 1966:117) with no qualifying examination for engineers until 1898 (ibid.:118). Apprenticeship invokes images of master-apprentice relationships. A notion that Lave and Wenger find 'surprisingly variable across time and place' (1991:91). They found that 'apprentice opportunities for learning are...given structure by work practices instead of strongly asymmetrical master-apprentice relations' (ibid.:93).

In keeping with my realisation that there are alternative descriptions of 'profession', that of it being a 'socially constructed, dynamic and contested term' (McCulloch, et al. 2000:6) seems apposite, encompassing the perceived gravitas of the expression yet embracing the sense of change central to this research. The term profession underpins some if its derivatives: professional and professionalism, as being the knowledge and

skill involved in specialised work that requires 'some form of higher learning' (Freidson 1986:26).

But what is 'professional'? A professional could be described as a member of a profession, but again this term has wider connotations. At one level, Harries-Jenkins views professionals as 'salaried employees' (1970:53) as distinct from a self-employed member of a profession. A professional relationship can give rise to a 'fiduciary relationship' (Freidson 1994:201). ACCA add integrity, objectivity and independence (2003:304) to this. Schon on the other hand sees 'one of the hallmarks of a professional' (1983:45) as someone with the ability to consolidate diverse knowledge and transform it to meet the specific requirements of the client.

Turner both connects and distinguishes between profession and professional. He considers a profession to have 'testing of competence and maintenance of standards' but also that being professional requires additional 'voluntary effort...to help in the common good' (1969:4). Other factors that may come into play include 'economic and technical factors' (Rothstein 1973:159) where individual influence may be limited. Eraut (1994:223) brings an organisational dimension to an employed professional pointing out that as knowledge increases so more specialisms emerge within the professions. This implies a professional has some discretion over what s/he does.

Moore identifies a professional as someone where the recipient of the service is also 'the employer' (1970:87) which fits well with Goodson and Sikes view that 'professional work cannot and should not be divorced from the lives of professionals (2001:71). Jahoda holds that 'trying to attach an operational definition to the term clarity of professional image' (1963:38) is difficult, not least because some attributes are not easily measured. Reader claims that in addition to depth of knowledge the distinguishing feature of a professional is that s/he must be able to 'cope with' (1966:117) the client, whereas Bligh adds 'skill, especially judgement' (1982:12) to the list. Following a generic approach, Perkin considers that professional hierarchies reach 'further down the social pyramid... [to] embrace occupations' (1989:3) not previously considered as professional.

In Tripp's view the ability to 'articulate the specialist conduct knowledge or the judgements that underlie what they do' (1993:6) is necessary to be regarded as a professional. Hoyle and John concur with this view suggesting that the 'recognised body of knowledge [is] one of the formative criteria by which occupational groups can be categorised as professional' (1995:45). However, the advent of the internet and subsequent explosion of knowledge has meant some erosion of power for the elite professions (Jarvis and Tosey 2001:155). The notion of professional can also be linked with 'control' (e.g. Lawn 1996, McCulloch, et al. 2000). For me, what services I am able to offer are closely monitored by ACCA, whilst in teaching this has been an ongoing debate. For this research the participants were all managers and already had an element of control over their working environment.

Since the 1950's there has been a well documented debate regarding the rise of the welfare state and the caring professions (e.g. Hoyle 1995, Lawn 1996, McCulloch, et al. 2000). Since then the increase in State intervention has given rise to reaction away from the professions, who were seen as powerful with 'privileges and pretensions' (Perkin 1989:472) that in times of unemployment seemed inequitable. The caucus moved in favour of consensus in the late twentieth century; from a 'tradition of service to conditions of employment' (Strain 1995:44). Ozga (1995) claims that the level of autonomy of teachers is the inverse of the amount of professional status of teachers.

Parallel to this, manufacturing industry has been the subject of constant and increasing amounts of change in recent decades (Jarvis and Tosey 2001:147). The 1980s and early 1990s saw the influence of Japanese manufacturing techniques which overlapped with increased influence and rate of change. So the engineering and teaching professions can draw parallels with a continually changing working environment alongside a greater pace of change. These changes in society affect individuals in their working lives. Private lives, private troubles and public issues are inter-related.

In the 1980s practical courses developed in higher education that identified teachers as using 'complex and highly personal knowledge' (Eraut 1999:61) in an 'intuitive way'. There are parallels here between teachers and managers in that they both act 'intuitively' while many managers are not necessarily aware that there is an academic framework to that which they do.

This research involves engineers and how MFG develops their 'management capabilities' (DIP 2002). At first sight they may act intuitively, but when reflecting, realise there may be some social constructs to support their actions. Bottery (1998:162) brings several arguments of this thesis together when discussing the role of the professional; those of reflection, change and economic reality. Reflection by professionals should lead to change – something this study seeks to demonstrate.

A broader term still is professionalism. Again there is variance in the meaning of the term. Lawn, for example, deems professionalism to be 'the degree of control exercised over work' (Lawn 1996:112). There is general acceptance that ideas of professionalism are 'varied, personal and often implicit' (Helsby 1996:140) resulting in what are possibly paradoxical views both from an internal and external standpoint. What seems to be generally accepted (Eraut 1994, Helsby 1996) is the belief that professionalism is something developed by an individual *in situ* rather than having it imposed externally. In Lawn's terms professionalism is seen as an 'individual attribute, something the teacher has or will acquire' (1996:119). The teacher unions consider a 'human relations model' to be preferable when reviewing professionalism (Beresford 1995:74).

Values developed in the workplace may be based on colleague example or suggestion. As people move jobs, so more dimensions of 'professionalism' may alert the individual to other ideas, that s/he may choose to adopt. In this way professionalism is a dynamic state. Eraut sees the ideology of professionalism as having three central facets: specialist 'knowledge-base, autonomy, and service' (1994:223). For Freidson ideology amounts

to the 'core of professionalism, [it] is its claim to a discretionary specialisation' (2001:109).

Yet another perspective of this trilogy of terms is the degree of autonomy each expression demonstrates. Autonomy relies on the individual being in control. In situations where professional judgement is used it will be based on individual knowledge being applied in decision making. It is important, therefore that that judgement is unencumbered by 'bureaucratic and political constraints' (Hoyle and John 1995:77). Freidson again: 'the formal institutions of professionalism establish the economic and social conditions which allow those with a specialised body of knowledge and skill to control their work' (2001:105). For him professionalism represents 'occupational rather than consumer or managerial control' (ibid.:180). Helsby argues that 'autonomy...had long been associated in public consciousness with notions of teacher professionalism' (1999:49).

Professional responsibility is 'the reciprocal of autonomy' (Hoyle and John 1995:103). Whitbeck writes that professional responsibility requires more than 'rule following...[it] requires maturity of judgement' (1998:74). The opportunity to act responsibly must not be abused. Professional judgement must be employed ethically otherwise client interests might not be a priority. Teachers, accountants and engineers must all be responsible for their actions if they are to be deemed professional.

Perhaps the term with the widest connotation and ambiguity is professionalisation, relating to the emergence of an occupational group as a profession (McCulloch, et. al. 2000:14). Ozga and Lawn prefer to depict pursuing a 'consistent strategy for development as an occupational group...as professionalism' (1981:14). They take the 'process' stance suggesting that certain occupations are restricted in their progress towards professional status for qualitative reasons such as gender (nursing, teaching) or unionisation (teaching, engineers). Helsby depicts certain teachers as having the idea that 'professionalisation [was] unproblematic' (1996:138) because in their view by entering the 'teaching profession' they deemed themselves as professional already. Professionalisation therefore implies the development of the professional occupation of the individual, rather than the attitudinal dimension of professionalism.

Weber emerges here as the 'prophet of bureaucracy, who saw very clearly that bureaucracy would require and foster the professionalisation of its members' (Schon 1983:326), created by a need for technical expertise. Returning to the issue of control in the workplace Freidson (1994:102) suggests that professionalisation is determined by the people performing the productive tasks. This is very true for engineers who by definition will be productive.

Ozga and Lawn take the stance that professionalisation happens once to an organisation in becoming a profession. This approach suggests a static social and political environment that is not sustainable in the present ever changing landscape. The increase in State influence contributed to the 'professionalisation of personal services' (Hoyle 1995:59). Hoyle argues that, in education, focussing on the consumer has resulted in

more central control, leading to accountability rather than responsibility, which in turn can lead to deprofessionalisation

McCulloch, et al. depict the efforts of the teaching profession to be 'publicly acknowledged as professionals...on the same level as, for example, medicine or law' (2000:14). To be recognised as a profession in a continuously changing environment requires unremitting efforts: 'to achieve fundamental change...generally requires challenge of the established forces' (Mintzberg et al. 1998:773). Professionalisation is perhaps taken for granted by Finniston. In an Inquiry reviewing the structure of the engineering profession, one finding was that:

> *British engineers are ill-served by a generic title not specifically associated with and reserved to a highly educated and vital professional group in society. (Finniston 1980:25)*

Finniston continued by defining an engineer as someone 'practising their discipline at a high professional level' (1980:25) and called for 'enhanced recognition of the nature and importance of engineering', adding that it did not seem feasible to protect the word 'engineer' by law.

According to Turner management 'cuts across conventional disciplines' (1969:8), making engineers as suitable for management as other professions. They have already grasped 'scientific method and...logical thought processes' which involve 'memory, knowledge and practice' to develop 'creative thinking and the development of reasoning powers' (ibid.:19/337). All these attributes should increase professional confidence, which 'may be affected by the personal characteristics and pre-dispositions of individuals and by their previous experiences' (Helsby 1999:173).

Other factors that enter the equation are 'similar for management and teaching' such as 'skilled behaviour' (Eraut 1999:66) and 'cultural and contextual factors...[and a] sense of being trusted and respected as a responsible and caring professional' (Helsby 1999:173). All these facets encompass the idea that 'wider societal obligations of professions' are to the public as well as responsibility to 'individual clients' (Saks 1995:11).

According to Eraut professional development 'should be planned and conceived as a life-long process' (1995:172). Can professional development in engineers draw any parallels with the professional development of teachers? According to Eraut teaching was considered to be something 'one learned how to do rather like driving a car' (1999:60) and was determined by 'subject knowledge with little evidence of ability to manage' (ibid.). This is also relevant to engineers. My view is that passing a driving test is more like the beginning of a journey; passing one's test does not automatically create an expert driver. With a high proportion of engineers taking an apprenticeship, learning by doing is important. For Lave and Wenger learning by doing is part of the term 'situated learning' which also incorporates 'apprenticeship' (1991:31) both of which are included 'under the rubric of legitimate peripheral participation' (ibid.).

I consider that to become a professional, expert knowledge, skill and experience have to be digested alongside developing an ability to draw on these different facets that should become intuitive:

> *Personal knowledge is partly tacit and partly apprehended. A significant consequence of this is that people are not aware of everything they know and only partly aware of their own cognitive frameworks.... Professional expertise is embedded in the quality of the processes that constitute such work. (Eraut 1999:64)*

Eraut links professional expertise here with cognition. There are four processes that contribute to cognition: 'acquiring and interpreting information; skilled behaviour; deliberative processes: such as planning, evaluating and problem-solving; and meta-processes, concerned with directing and controlling one's own behaviour' (Eraut 1999:64). While Eraut argues that developing professional expertise requires the use of 'personal knowledge' and 'public knowledge' he introduces a third dimension that of 'images and impressions...that are held in the memory' Eraut (1999:63). Cognition and memory will be discussed in the next section of this chapter.

The four terms discussed in this section are used widely in general conversation without any clear delineation of their individual meaning. In my opinion, to belong to a profession one must have sufficient technical expertise to be able to meet the needs of a client by drawing on this expertise, but also have the ability to communicate that knowledge effectively to those who need to know. A professional is someone who may or may not belong to a recognised profession but who holds himself out as belonging to a profession. It has wider connotations and exhibits a more active role for the individual.

Professionalism encompasses the holistic approach suggested by Hargrove (1972). Individuals demonstrate professionalism in their approach to many issues that may not always be directly related to their working environment, but which require a professional approach. Professionalisation relates to attempts by a generic group or organisation intent on enhancing the status of its occupation, this may be achieved through greater skill or public profile.

3.2 Cognition, Learning and Memory

This section considers ways cognition occurs, and what influence memory may have on cognition and different types of learning. Every time something is remembered, a new memory is created (Rose 1992:3). How individuals develop their understanding of the world, or the 'process of constructing beliefs' (Chaffee 1996:202), is known as cognition. Lave, taking an inclusive stance, deems cognition 'as stretched across mind, body, activity and setting' (1988:18). The cognition hypothesis is based on Piaget's ideas that 'language needs certain cognitive precursors to develop' (Harley 2001:72). This is also known as the Whorf Hypothesis (Carroll 1994:372). From a psychological perspective cognition has been described as a 'synonym for thinking' (Tolman 1987:255) that integrates nervous activity and stores and organises past experiences.

Identifying the resulting problems and their related solutions can lead to directional planning to achieve specific results.

Defining memory is beyond the scope of this research. To remember something is to 'experience it again, but not in the same way as the first time' (Langer 1953:263). It differs from the actual experience because we only experience any sensations the first time. It is a process that filters out extraneous data. It is this 'sifting process which transforms memory into meaning' (Rosen 1998:101), but according to Kokawa et. al. the fuzziness of memory increases as time passes (1975:417).

As with many things memory has been classified in several different ways. Rosen identifies that:

> *autobiography is the rendering of memory into discourse.... It grows out of different kinds of images which in their turn, when they are verbalised, are shaped by a diversity of textual resources and social contexts. (1998:99/129)*

Before memories can be recounted, they need to be stored in the mind. This suggests that all conversations that rely on memory are autobiographical, but there are alternatives. Certain things we do instinctively. One dimension concerns whether the memory is situated in individual memories or whether the construct that created such memories came from interaction with others, social memories.

Tulving (1983) identifies two primary types of memory. Procedural memory relating to motor and cognitive skills - how to do things such as make an omelette or *'knowing how'*, and propositional memory that encompasses behaviour and attitude. Propositional memory can be subdivided into: episodic - memories of personal encounters such as a wedding (Rosen 1998:102); and semantic memory - which refers to 'organised knowledge of words, concepts, symbols and objects' (Carroll 1994:51). We need these memories to function on a day to day basis, such as remembering the route to work. These two terms are linked to form declarative memory or *'knowing that'*. Procedural memory is dominant in animals, declarative memory is dominant in humans (Rosen 1998:111).

Another classification is based on how hard it is to remember something. Automatic memory is when recall is effortless, while a thing people may struggle to remember is known as effortful memory. With implicit memory you were not aware of learning, such as things learned in childhood; while explicit memories are those that you learned consciously. Time taken for recall gives rise to another form of categorization. Memory is made up of short-term, working and long-term memory. Short-term and working memory provides processing capacity whereas long-term memory is 'a repository of our knowledge of the world' (Carroll 1994:51) making recall easier. If cognition is improved by powerful images of real life situations, memory must also play its part.

Thinking is how individuals make sense of their world, by organising, analysing and decision making. Perceiving requires using one's senses to become aware of our

surroundings (Chaffee 1996:135). Individuals construct beliefs based on their perceptions, and knowledge is built on these beliefs. Membership of a community contributes to aspects of self-awareness and shape 'individuals' values and standards in the domain of community activity' (Greeno et al. 1999:139). Choosing between various alternatives requires thinking to reach a decision, using 'possibilities, evidence and goals' (Baron 2000:7). Evaluation of such alternatives requires judgement of one or more possibilities. It is decision making. Critical thinking uses 'cognitive skills or strategies' (Halpern 1996:5) to improve the possibility of an acceptable result.

When people think critically they 'become aware of the diversity of values, behaviours, social structures and artistic forms' (Brookfield 1987:5) that are around them. This 'active thinking' enables us to 'question, explore and deal effectively with' (Chaffee 1996:76) different events. It means identifying and challenging assumptions, then putting them in context so alternative solutions can be considered. Thus critical thinking qualities are a combination of cognitive abilities, basic attitudes, and thinking strategies that encourage clarification and understanding of the world (Chaffee 1996).

The social aspects of cognition cannot be ignored. Wenger emphasises that learning should be focussed on participation as a way 'of engaging in and contributing to the practices of their communities' (Wenger 1998:7) A group situation could provide triggers for 'cognitive dissatisfaction outside the individual' (Glaser 1999:99). The group could offer alternative viewpoints that might challenge an individual's initial thinking, whilst providing a focus for the task in hand. Lave and Wenger advocate that 'participation is always based on situated negotiation and renegotiation of meaning' (1991:51). Individuals contribute their personal strengths whilst gaining from the greater skills of others, resulting in improved individual competences.

> *We often forget how much learning happens through our normal life. It is often in difficult situations and out of the ordinary incidents that generate learning opportunities. But people can use these situations as learning opportunities only if they have the skills necessary to recognise them as such. (Sallis and Jones 2002:84)*

Dewey (1938:17) summarised learning as a continuity of experience, with the quality of that experience having an impact on the learning benefit. Reflection is vital in linking the discrete elements of experiences into a coherent framework that allows individuals to create their own sense of order (Fraser 1995:4). For Van Ments, reflective observation is needed to associate experience with change, which links experience with the 'conceptual framework of the learner' (1990:60). Reflective learning is:

> *the process of internally examining and exploring an issue of concern, triggered by experience, which creates and clarifies meaning in terms of self, and which results in a changed conceptual perspective. (Boyd and Fales 1983:100)*

Reflection is important to the debate surrounding critical occasions. Without contemplation no learner can make 'connections... between the new material and

previously learned associations' (Bass and Vaughan 1966:37). Linking back to professionalism Eraut suggests that 'thinking skills of a higher order are needed in tackling practical problems' (1995:181). Without thought there can be no memory.

> *The seemingly endless and enduring capacity of human memory is a deep mystery in itself. How can the neuronal system, even in its immeasurable complexity, throughout a lifetime continue to store numerous, detailed segments of the information flowing into it...? What lingers at the level of incomprehensibility is recall, the ability, effortlessly, to float mentally through happenings long past, associating myriad details with such rapidity as to defy easy conversion into speech. (Doty 1998:1075)*

Various mechanisms have been suggested as to how people learn. Corning and Ratner put forward 'analogy, correlation, symptom and participation' (1967:6) while Bass and Vaughan suggest trial and error, perceptual alteration, modelling and mediation, leading to problem finding (1966:37).

These mechanisms give rise to different types of learning curve, a different shape depicting distinct types of learning. One curve, showing a plateau part way through the learning process, usually associated with higher learning, is shown below. Other alternatives include negatively accelerated and positively accelerated curves. These learning curves have a similarity with Kubler-Ross's (1970) seminal work on attitudes to death and dying, where the phases are: denial, anger, bargaining, depression and acceptance.

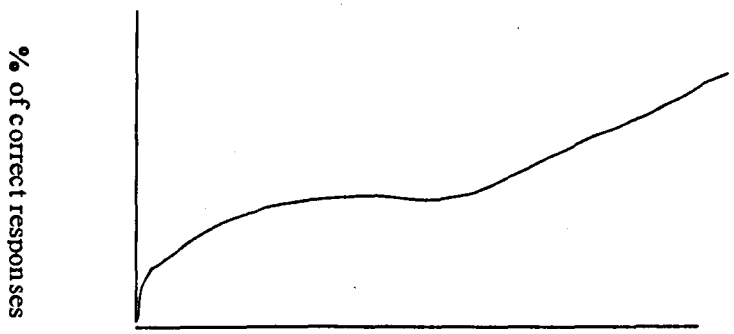

Fig.1 A Hypothetical S-shaped learning curve (Bass and Vaughan 1966:45).

Successful learning is frequently located in a social network of some kind and learning how to think critically is no exception (Brookfield 1987:78). Fellow students may give invaluable guidance to their colleagues: 'environmental stimulus' (Bass and Vaughan 1966:33) or 'peer interaction is a major contributor to students' cognitive development' (Knapper and Cropley 2000:116). Networks can be of different types including: structural, individual's total network, interactional networks, partial networks. All have the common theme of having limited resources where participants can 'exchange

resources in mutually beneficial ways' (Sarason et al., 1977:21). Human networks share information, and it is people 'in their communities, organisations and institutions who ultimately decide what it all means' (Brown and Duguid 2000:18).

Learning can be a lifelong process involving change to an individual that improves skill, understanding, technique or attitude (Liveright 1968:5). Knapper and Cropley describe learning as 'planned, intentional preparation...a way of short-circuiting personal experiences by drawing upon the accumulated experience of others' (2000:43). Experiential learning had no place in university education for many centuries (Houle 1976:20). In Kolb's view it is 'the process whereby knowledge is created through the transformation of experience' (1984:38), or as Eraut describes it happening during the normal process of maturing (1995:175).

Experiential learning occurs when people experience a situation, which after discussion, reasoning and reflection results in a changed and more experienced person (Benn 1993:3). The fact that 'discussion' occurs can in itself cause stress. Speaking in front of any audience 'will have some degree of stress associated with it' (Howe 1988:19, Gruzelier 2003). The level of tension will fluctuate depending on the circumstances, for example speaking at a job interview is very different from chatting to friends. Concern over the response from a tutor may lessen the desire to speak out.

For Knapper and Cropley experiential learning represents 'learning by doing...it is the basis for the apprenticeship system' (2000:102). It has the capacity to facilitate transfer of learning skills to real-world situations. Learning transfer 'deals with whether or not learning in one situation will facilitate learning' in another (Bass and Vaughan 1966:38). Lave (1988) likens the metaphor of learning transfer to it being a toolbox. The toolbox could include many specialist tools used occasionally, or a few well designed ones used in different combinations. Strangely, the tools bring about change, but do not change themselves, acting as a catalyst.

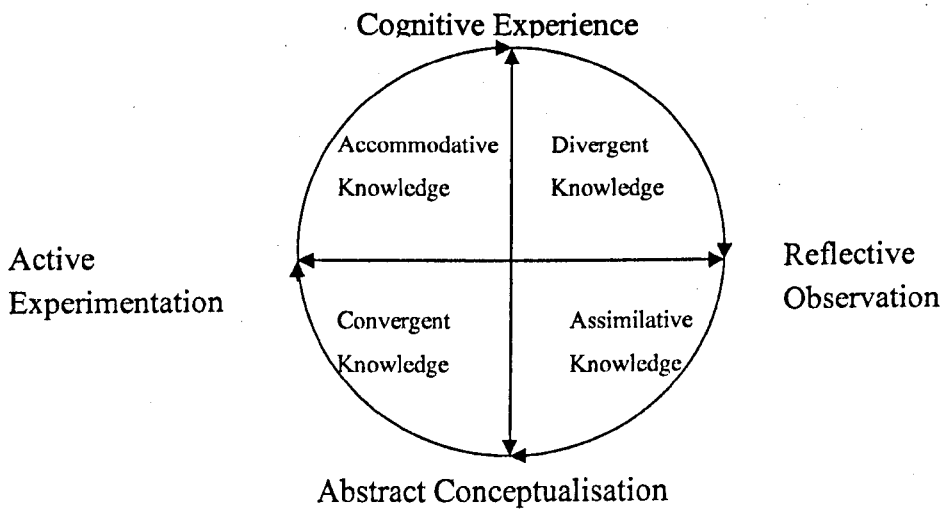

Fig. 2 Based on Kolb's Structural Dimensions Underlying the Process of Experiential Learning (1984:42).

Dennison and Kirk (1990) offer an alternative view suggesting students left to themselves might not organise a learning cycle, but with the aid of a tutor this process can be smoothed. Experience alone does not guarantee that learning occurs, reflection is also necessary for cognition to occur, this could include:

> *mulling over events...making sense of our experiences....Groups of people engaged in reflection... need time to catch up or take stock on occasion...or to share other peoples experiences.... Reflection is not a single faceted concept, but a generic term that acts as a shorthand description for a number of important ideas and activities. (Boud, Keogh and Walker 1985:8)*

Reflective activity in an educational setting has three stages. Firstly when students become aware of the tutor's expectations, which may induce an element of anxiety. Secondly the new experience, which may tend to engulf the student with new ideas or observations. This influx of new data may have little chance of being organised as more information is piled on top, leaving little opportunity for the material to be 'organised' (Chaffee 1996) resulting 'in the learner resorting to coping strategies' (Boud et. al. 1985:10).

The third stage requires feedback from student to tutor. To do this the student will have to 'dredge their memories' (ibid.) and this is when they realise that their knowledge is frequently incomplete. The process of filling in the gaps may provide the key to learning about the experience. For an individual Powell applies the term 'autobiographical learning' (1985:42) to this process, connecting experiential learning to Rosen's (1998) autobiographical memory.

The impact of group dynamics on learning has been articulated on occasion. Van Ments perceives several 'processes are going on at the same time' (1990:17) with participants being willing to listen to others for it to be effective. It seems generally accepted that discussion 'will usually produce more personalized emotional effects of an educationally desirable nature' (Hill 1969:15), the anecdotes offered may well increase the effectiveness of the learning. Adding a note of caution, Lave and Wenger intimate that 'conflict and synergy is central to all aspects of learning in practice' (1991:103). Rallis et al. suggest that 'dynamic teachers create, facilitate, question, connect and coordinate' (1995:76), smoothing the learning process. Rudduck suggests that 'conventions for the groups' learning' (1978:22) need to be made explicit and that the facilitator has a large part to play in the success or failure of such activity.

Methods of group learning include role playing, case study, syndicate exercises, human-relations training, and simulation exercises (Knapper and Cropley; Bass and Vaughan) that lead to multi-skilling or up-skilling. To be able to benefit from this 'up-skilling' people need to 'have a deep understanding of the domain [work tasks]...and have the capacity to engage in other thinking skills such as problem solving and critical thinking' (Pillay, 1998:81). Group learning can involve conflicts. Sometimes these differences are 'played out in practice, legitimate peripheral participation is far more than just a process

of learning' (Lave and Wenger 1991:116). The strength of group learning is the inclusive nature of the common ground being discussed in real time (Rudduck 1978:31).

Changes in attitudes and values suggest that 'participation, discussion and discovery are more likely to be effective' (Bass and Vaughan 1966:54). These are attitudes that Van Ments describes as acting as emotional and intellectual parameters. One development of group learning is that of networking. Fullan describes peer networks as 'a form of systematic knowledge exchange' (2001:97) or 'pervasive interrelatedness' (Sarason et al. 1977:10). There is a general view in business that knowledge management is necessary to move forward and 'network leaders are the nurturers of knowledge communities' (Sallis and Jones 2002:32).

Attitude 'may combine both instinct and habit in any proportion' (Allport 1954:15) but which has several meanings. Attitude can relate to physical attributes or cognitive issues. Cognitive attitude has 'three components: the affective component – feelings; the cognitive component – thought; and the behavioural component - a pre-disposition to act' (Kiesler 1971:4). These three attitudinal perspectives may have an impact on aspirations to belong to a particular group.

Membership, or aspiring membership of a group can affect the attitude of an individual and each can impose different demands on individuals. Greater change occurs with people who would have preferred not to be part of the group but find themselves drawn in (Siegel, & Siegel 1957:187), while Astin found that where 'some individuals lose others gain' (1977:199) from group experience.

Interaction with others can be widened to link education with the workplace and the 'need to forge much closer links between higher education and a wide range of work settings' (Knapper and Cropley 2000:98). Therefore continuing education can fulfil this need by bringing 'education closer to life' (Liveright 1968:2). Most classroom based activity cannot be closely related to the job as 'on-the-job training...its major weakness is the failure to incorporate materials that will facilitate transfer of learning (Bass and Vaughan 1966:92). In the work environment critical thinking is vital, without it 'innovation, creativity and flexibility' (Brookfield 1987:139) would not occur, and change would therefore be limited.

To learn something people must 'store its underlying structure' (Carroll 1994:182) in their memory. This is done at surface and deep levels in the short term. It is this deeper thinking making use of the 'surface' knowledge that Eraut likens to an iceberg (1995:180). Memory involves a series of processes each with its own operating principles (Halpern 1996:40). Comprehension is essential if the memory is to be good. By using familiar workplace examples, individuals can make connections at a subliminal level to improve their memory framework. Being a 'better driver of your own memory system' (Halpern 1996:40) increases the ability to retain, and recall information using 'one's own operating rules, or examples' (ibid.).

Carroll identifies that skilled tutors can 'inter-weave presentations and questions... to encourage students to inter-relate and interpret information' (1994:238), which in

Brookfield and Preskill's opinion 'leads to reflective scepticism' and encourages participants to 'challenge assumptions'. This is 'central to helping people think critically' (1999:90). Challenges can be dyadic. Tutors may embed learning effectively by skilled questioning.

For participants, challenging presenters' means taking a risk, but doing so within a safe learning environment is a good springboard. A classroom can be a 'safe place to explore and test their ideas against what is already known and what others are developing' (Rallis et al. 1995:75).

> *Critical processes are more likely to flourish in an atmosphere in which those involved feel no sense of fear in trying out new ideas, testing tentative explanations and offering widely diverging interpretations of events – an atmosphere in which critical thinking is both valued and encouraged. (Brookfield 1987:243)*

Questioning of situations and analysing issues can lead to 'reciprocal and involving' (Brookfield 1987:236) conversations, the direction of which may be unplanned. A good tutor may encourage this in an active purposeful way 'to clarify and improve understanding' which is effective in a 'social context' (Chaffee 1996:47). Cognition cannot regard any one system as closed; its boundaries 'encapsulate aspects of the environment, society and culture' (Harris 2000). This 'situated view of mind' makes 'situated learning, the activities of people and environment...parts of a mutually constructed whole' (ibid.).

Developing this, Romer characterises situated learning as focussing on 'knowledge as it is found and developed socially in practical contexts' (2002:233), while Billett describes it as 'learning through goal directed activity situated in circumstances which are authentic' (1996:263). Billett compared sociology and cognitive psychology research to conclude that they provide the 'capacity to transform views about learning, the transfer of knowledge and expertise' (ibid.:277).

Everyone thinks differently, with emotions playing their part. There is no definitive way of facilitating critical thinking but in a teaching environment diversity of method and materials is helpful. Everyone is 'good at inventing and using tools but also in the resourceful use they make of their surroundings' (Roth 1999:16). This 'situated cognition' depends on finding the solution to practical problems, and relies on understanding the 'problem-rich learning environments' that give rise to 'communities of practice' (ibid.) or groups of individuals that adopt defined conventions from which they all should benefit. Critical insights often occur unexpectedly: 'it is not uncommon to be thinking about some aspect of one's life and experience a sudden flash of insight concerning an apparently unrelated area' (Brookfield 1987:231). When exchanging ideas with others, individual viewpoints gain validity as other people appreciate comparable ideas.

This section has reviewed issues surrounding cognition, learning and memory. It demonstrates that all three spheres have diverse behaviours that not only have

contradictory ways of depiction, but also the manner in which individuals respond is different. Critical thinking is needed for people to change. How that comes about may occur by inventive thinking.

> *It is by no means uncommon for innovative thinking to lie quiescent like a hibernating bear and to be roused after a great lapse of time into vibrant new life. (Rosen 1998: 118)*

The next section of this chapter considers under what circumstances these crucial events might happen, and what types of episode they might be.

3.3 Critical Occasions

Payback, a common playground word, has a specific meaning in accounting terms that is unfamiliar to a lay person. The phrase critical incident is similarly used without reference to definition. This section examines the origins of the phrase 'critical incident' together with some common derivatives, which I have called collectively critical occasions.

One early writer on CIT was Flanagan. To him an incident was 'any observable human activity that is sufficiently complete in itself to permit inferences and predictions to be made' (1954:327) about what is happening. In his view what made it critical was that the 'consequences were sufficiently definite' that the outcome was rarely in doubt. As Flanagan observed, the technique has occurred for many centuries, being used by Sir Francis Galton. Flanagan applied it to determining the 'specific reason for failure in learning to fly' (1954:328). Reasons for pilot failure included 'unsuitable temperament, poor judgement or insufficient progress' (ibid.:330) none of which was measurable precisely enough to leave little room for doubt. These terms could be fuzzy logic descriptors.

Flanagan's critical incident project developed and refined criteria that would identify successful pilots. Essentially:

> *it is a procedure for gathering certain important facts concerning behaviour in defined situations...it should be thought of as a flexible set of principles, which must be modified and adapted to meet the specific situation in hand. (Flanagan 1954:355)*

Previous research on critical occasions is fragmented. It has been researched in medicine and the caring professions. Within education literature two key texts on critical happenings are Tripp's (1993) Critical Incidents in Teaching, and Woods' (1993) Critical Events in Teaching and Learning. The word 'critical' can be associated with many nouns; for this research I have selected words that denote change. While I have tried to be discriminating this selection is by no means exhaustive.

Woods' text relates to major happenings in the lives of distinct groups of three primary schools and one comprehensive school undertaking different projects: a musical, making a film, designing a visitor centre and writing a book. Each project was very

different in nature, time-scale and the number and type of participants. What is common to each of these events is that they were out of the ordinary – both for the participants in terms of educational activity, and that each project achieved critical acclaim in its own right. For the children, whenever they look back at these critical events, they will be imprinted in their memories for these two vital reasons.

Woods rightly identified these happenings as events – things that have had a momentous impact on the individuals concerned. What made them critical as far as Woods was concerned was that the benefits of participating in these projects were far greater to the individuals than merely participating in the project. Many people can learn the lines of a musical and perform it with pride, but these were occasions when individuals grew in stature far more than merely performing a role. What made them memorable was that they were out of the ordinary. They were not essential.

Woods considers that critical events go through 'well-defined stages' (1993:8) that include conceptualisation, preparation and planning, divergence, convergence, consolidation and celebration. This has parallels with the process Flanagan went through in developing his technique. In order for any event to pass through these well defined phases there must be some passage of time. This time span may vary from working full time on a project, or part-time over a longer period. Sometime during or after each event, individuals were able to look back and identify that they had changed, usually positively, in ways greater than they had expected.

The outcomes from these activities generated increased confidence, greater self-esteem and better membership of peer groups. These are all happenings that improved personal or emotional development in addition to educational advantage. This might have involved a new communication medium, or enhancement of an existing skill, but all involved change. Another benefit was that participating individuals learned something about others, making the learning process holistic and 'something special' (Woods 1993:143). Moreover a supplementary improvement was that people involved in the events in a supporting role also derived benefits. The teachers learned more about themselves as individuals; they could reflect and adapt future teaching after taking risks in situations where this was not normally an option.

Tripp's (1993) text discusses critical incidents in teaching and is centred on teachers developing professional judgement, sometimes by reflecting on seemingly simple events to inform their future judgements. Using CIT, Tripp contends that teachers can raise their professional status and improve their public image. He suggests that using CIT they can diagnose issues that enable them to:

> *employ profession-specific knowledge and expertise to recognise, describe, understand and explain their practice in an academic fashion and to interpret that diagnosis in order to form expert professional judgements to further the well-being of their clients. (Tripp 1993:7)*

Thus Tripp suggests that an academic slant is necessary to improve the standing of the profession by developing 'professional judgement through diagnosis and interpretation of critical incidents' (Tripp 1993:7). He then offers a selection of critical incidents, relating to school happenings, that he uses to illuminate what he means. The time-scale of these episodes may last from a few seconds to several minutes. Some of these incidents could, at first sight, appear trivial but through insight and analysis he demonstrates their importance to developing professional judgement.

Brookfield (1987:179) uses critical incidents to encourage learners to develop critical thinking. He distributes a set of guidelines to students which are clear enough for them to identify an incident that once it is analysed becomes critical. Tripp suggests a framework through which critical incidents can be evaluated including thinking strategies, the 'why' challenge; dilemma identification and personal theory analysis; leading into ideology and the practicalities of developing a critical incident file and examples of incidents from different perspectives. His book concludes with discussion about how this technique might improve professional judgement.

What of the terminology being used in these two texts? Tripp uses 'incident', Woods uses 'event'. Woods (1993) starts with a description of critical incidents taken from Sikes, Measor and Woods: 'highly charged moments and episodes that have enormous consequences for personal change and development' (1985:230). Woods continues:

> *they are unplanned, unanticipated and uncontrolled. They are flash-points that illuminate in an electrifying instant some key problematic aspect or aspects of the teacher's role, and which contain in the same instant the solution. (1993:1)*

Woods sees critical 'events' as something between a 'flash-point critical incident' and a career-phase happening, which are integrated with educational activities lasting from a few weeks to over a year. What is key is that they combine matters abutting the activity itself to make the whole occasion bigger than the original happening. Tripp considers that critical incidents are 'not things that exist independently' but in his view:

> *...critical incidents are created. Incidents happen, but critical incidents are produced by the way we look at a situation: a critical incident is an interpretation of the significance of an event. To take something as a critical incident is a value judgement we make, and the basis of that judgement is the significance we attach to the meaning of the incident. (Tripp 1993:8)*

These two descriptions, of 'incidents' and 'events', immediately pose a dilemma. Are they one and the same, or differing ends of a continuum? Tripp's description suggests critical incidents relate to the analytical description of a specific happening, whereas Woods' identifies a critical event as more of a one-off occasion. The difference between these descriptions leads to a consideration of how a critical occasion is identified in earlier studies.

The early part of Flanagan's description 'defined situations' does not fit easily with that of Tripp. Flanagan leads down a path adopted by some fields, notably medicine where an incident is something that could result in 'adverse or potentially adverse' (Meurier 2000:203) events. In medicine, as in flying, the consequences could be catastrophic and discussing failure in these circumstances rarely happens for fear of the consequences. Another branch of medicine where CIT was used is psychology. Flanagan applied CIT to manufacturing industry to identify the critical parameters needed by potential employees for General Motors in 1949. Fly et al. (1997) linked CIT with ethics and training by setting graduate students moral dilemmas. In their view the students did not understand some implications of the tasks given, and training was amended accordingly.

The second part of Tripp's definition of critical incidents relates to identifying an issue and subsequently examining it to identify critical aspects of it. What Tripp suggests is taking an incident and reflecting on it; that reflection made it critical. Smith (1998:893) used the critical incident technique when teaching reflective practice to nurses. Her approach was similar to Tripp's, that of asking students to depict an incident and then using reflection to analyse the issues.

Perry's research examined crucial issues in the working lives of registered nurses. She examined individual experiences using CIT to 'foster reflective practice, personal and professional development' (Perry 1997:132) and identify what events were deemed critical by working nurses. This approach is similar to Tripps' method and here Perry used 'events' as a key word within the text, lending support to Woods' notion of critical events, and combining aspects of both key texts.

Events are much bigger happenings. They are milestones therefore easily remembered, but are they critical in the sense Flanagan meant, or are they part of the same continuum as Tripps' critical incidents? Previous education research offers other alternatives.

A critical moment might be similar to a critical incident in terms of time-scale. Thomson et. al. offer critical moments as times of 'biographical change' (2002:336). Their life-cycle research took the stance that at any one time there will be different 'strands' in a person's life: education, family, employment etc. A defining moment might happen along any one of these strands at any time. Thomson et al. contend that the diverse strands might not all progress along life's path at the same pace and suggested that their results offer an:

> *important addition to [the] analytical repertoire enabling comparison across narratives.... Providing a link between theoretical understanding of fateful moments and empirical accounts. (Thomson 2002:351)*

In a later work Woods reflects on happenings within his original research that were 'critical moments....that can be either positive or negative' (Woods 1998:42). Woods chose to concentrate on positive moments, but did mention occasional negative ones. He depicts critical moments as having three 'distinguishing characteristics: 1) they lead to exceptional insight; 2) this result is unanticipated; and 3) they are radical in that they

lead to new directions for the research' (ibid.). Woods identified more specific times within his original research including critical recovery, critical situations and critical agents. Each of these categories emerged after Woods had time to reflect on his original study, and each seemed to be pivotal in its own right, suggesting that they were part of the original event but perhaps had been hidden within the primary data.

Lave and Wenger (1991:31) use the term 'moment' as being important to their process of establishing situated learning. The setting they describe for their 'moment' lends itself to these events being critical moments. One was when they realised that the term 'apprenticeship' needed revisiting and the other was associated with 'learning *in situ*' (ibid.). Merilainen and Pietariiinen (2002) depict critical events, or turning points in professional development of some teachers in rural schools. The occasions themselves are not necessarily large in time-scale or impact; one example was having only one football in a school. The issue here was more that there was a chasm between teaching 'theory' and practical reality. The examples they offer range in cause and effect, but generally represent Tripps' critical incidents rather than Woods' critical events.

Critical phases seem to be longitudinally the largest category of critical occasion. Sikes, Measor and Woods identify phases as 'definite, identifiable phases of the teacher's career' (1985:25) that are identified by the teachers themselves. These 'phases' become critical when a teacher moves from one phase to another during a period of transition (ibid.:57), rather than following Tripps' analytical technique. This can be related to Thomson et al.'s critical moments and different strands meeting. To Sikes et al. a critical incident involves 'challenge' (ibid.:69). Their study has parallels with my research in that my interviewees were asked to highlight their own critical occasion. Accordingly the participant made it critical, not the researcher in both instances.

All the types of critical occasion discussed here require reflection. Reflection allows individuals to adjust their thoughts when problem solving. Critical reflection 'involves a critique of the presuppositions on which our beliefs have been built' (Mezirow 1990:1). Mezirow uses the phrase 'higher order mental processes' as a synonym for reflection, and sees it as becoming critical when prior understanding is challenged, 'the why ...not the how' (ibid.:13).

While writers such as Brookfield, Halpern and Mezirow consider critical reflection as key to 'emancipatory approaches to education' (Reynolds 1998:183), in management learning the concept is a fundamental component of problem-solving. Reynolds propounds theories about why critical reflection has not been widely adopted in management education including the insecurity of managers; and that transforming 'critical theory into the everyday practicalities of educational method' (ibid.:184) is tricky. Saltiel (2003) adopted a similar approach to his research with social workers, but here the incidents the social workers examined had already occurred; the reflection involved evaluating what happened, following Woods style.

Critical reflection is the theme of Ghaye and Ghaye's (1998) study of reflection-on-practice. Their study relates to student teachers' reflections and builds on Schon's

stance of the reflective practitioner. In their view 'critical reflection cannot be meaningfully undertaken without an understanding of and a willingness to confront the big and complex issues' (1998:34). It involved reflection by individuals, but drew on other people as necessary. Harrington et al. puts critical reflection succinctly, suggesting that reflection takes on wider boundaries than the situated context of, for example, the classroom, to incorporate wider confines, a move from 'an egocentric focus to one that is more sociocentric' (1996:26). They judge that 'open-mindedness, responsibility and whole heartedness in critical reflection' (ibid.) encourage repositioning.

Learning creates change; growing in confidence and greater professionalism all result in change. For this to occur, some transformation must take place with the students in my research. Many of the elements discussed in this chapter will combine to generate momentum in unrelated combinations at different times to introduce change.

> *A culture of change consists of great rapidity and non-linearity on the one hand and equally great potential for creative breakthrough on the other. The paradox is that transformation would not be possible without accompanying messiness. (Fullan 2001:31)*

What is interesting about Fullan's idea is that it relates to Thomson's critical moments, suggesting that there are several parallel strands happening at any one time, travelling at different speeds and in different directions. Looking for the points where the 'rate of change is changing – [the] inflection point' (Hamel 2000:122) will lead them to discontinuities, and hence opportunities, similar to Woods (1998) critical moments. An alternative situation is for threads moving at different rates impinging on one another, 'change differentials' acting as a flash point for opportunity. For managers to build on these pivots, they need to 'learn how to unlock [their] imagination' (Hamel 2000).

Rudduck (1991) adopts the stance that change is restricted on occasion by suggesting that it is the 'tenacious conservatism' of the institution that limits change. Understanding the change process involves not just innovating the most; this can cause complexity in implementation making change less effective, nor is it 'enough to have the best ideas' (Fullan 2001:34), managers also need to get buy-in otherwise implementation cannot happen. They need to be aware that there may be a dip in productivity as people adopt the new processes and understand that equilibrium will re-establish itself in the longer term.

3.4 Summary

In my view a profession is a generic occupation that requires some form of higher education, and applies skills and knowledge to meet the needs of its client base. To me a professional is a member of a generic occupation with the aforementioned proficiencies whose main activity is applying the skills and competencies of their profession. S/he may be employed or self-employed but their professional stance includes being reflective (Tripp 1993:5). Professionalism has a wider spectrum than either profession or professional. It embraces the whole philosophy of the person in question, encompassing the professional requirements as laid down, but also the wider ideals

expected of someone working in the professional arena. In short it becomes a way of life, a way of thinking and relating to other people, clients, friends and colleagues.

Cognition, learning and memory demonstrate similar diversity. Cognition has a range of definitions. It occurs in different ways and time-scales for each individual, as does memory and learning. I consider cognition to be thinking and recognition of something new; learning the ability to understand and apply something new and that memory underpins each of these activities. Memory also takes different forms, including episodic and semantic memory. An added dimension is that there are several different ways of learning. Experiential and situated learning being given prominence.

The phrase 'critical incident' embraces a variety of terms that are imprecise and oft used. Examples range from a critical moment, that depicts a brief time span through to a critical phase which Sikes, Measor and Woods suggest may span several years. All have something in common in that they are easily identifiable. Their treatment in previous research varies from happenings that are themselves critical through to occasions that at first sight appear trivial but are transformed into critical occurrences by the act of analysis and reflection.

If change is to be successful it must be managed (Morrison 1998:16). For my participants to benefit most from the MSc., they must change. Change is natural and inevitable. What is needed is the ability to identify what is important, and not 'misinterpret' vital arenas (Fullan 1991:31).

> *Change is a leader's friend, but it has a split personality: its non-linear messiness gets us into trouble. But the experience of this messiness is necessary in order to discover the hidden benefits - creative ideas and novel solutions are often generated when the status quo is disrupted. (Fullan 2001:107)*

The next chapter provides an insight into the background and modus operandi of MFG. It demonstrates the learning environment in which the respondents study and differentiates MFG from other establishments in the neighbourhood.

CHAPTER FOUR

4 Life at Midshire

This chapter describes the contextual location of both the University and the Manufacturing centre on which this study is based. It explores the reasoning behind establishing MFG, and plots its development to the current day. The course structure and ethos are outlined, together with the life cycle of a module from the perspective of a module tutor and that of a student. This chapter provides a backdrop for the fieldwork chapters that follow.

4.1 Background

Science education in a University setting began with engineering at King's College London (Sanderson 1972) in the 1840s. Prior to this, science was seen as a 'fit hobby for well bred amateurs' (Reader 1966:7). In 1902 Rashdall advocated a change of educational emphasis, from creating capable graduates with rational principles, to developing 'an education which will fit men for professional work' (Sanderson 1972:26). By 1912 there were insufficient graduates to fill the range of available business opportunities and demand continued unabated through the Second World War. More people staying on at school created additional need for university places. After the war, demobilization and the post-war demographic bulge fuelled an urgency for university education. In contrast to preparing this elite, universities now 'prepare people for the world of work and maintain them in it' (Jarvis 2001:6).

In 1943 the 'national output of civil, electrical and mechanical engineers was only about 3,000' (Pratt 1999). In 1946 the Barlow Report identified a need to double the number of science graduates 'at the earliest possible moment' (Para. 23), a milestone achieved in four years. In 1955 the University Grants Committee [UGC] was instructed to increase the number of technology students (Simon 1996) and expand university provision (Silver 1990). Additionally, in 1956 the Government highlighted a causal relationship between industrial production and the number of scientists and engineers (Zuckerman 1996:73). Encouraged by this, the Midshire locality began thinking about creating a new University.

4.2 Foundations

4.2.1 A Difficult Birth

The vicinity of Midshire has two distinct economies. The eastern city region has an industrial heritage, which needed much post-war rebuilding. The area to the west is rural shire-county. With no local university, both councils paid a levy to a neighbouring establishment (Shattock 2002). Midshire University was first mooted in 1954 (Thompson 1970) when the left wing City Council was vigorous, but there was opposition from local institutions which considered technical education more in keeping with the engineering strengths of the area (Shattock 1999). The dichotomy of the region exacerbated these early tensions and delayed Midshire's creation (Shattock 1994).

In 1958 the Government announced plans for new Universities (Thompson 1970) and a far-sighted official from the city (Shattock 1994) seized the opportunity to visit the Vice-Chancellor [VC] of the neighbouring University. The VC agreed to lend support for a new university on the basis that his establishment could not grow much more, and had distanced itself from the locality (Shattock 2002). He did not see a new university as a threat (Shattock 1994).

The City Council identified land to the west of its area that was matched by a similar amount of land at the interface with the County Council. Midshire is in the industrial heartland of Britain. Its desire for more technology students differentiated Midshire's bid from others of the time (Sanderson 1972), and was in line with the need identified by Robbins (1963:128) to increase technology students. Midshire had a strong case.

The University was given Government approval in 1961 just as the Robbins committee on Higher Education (1963) was convened (Carswell 1985, Shattock 1994) receiving its Royal Charter in 1965 (Midshire 2002a). It was 'allowed the privilege of devising [its] own courses and granting [its] own degrees from the beginning' (Sanderson 1972:368, Shattock 1994) without serving a pupillage to an established University as was usually the case.

The UGC had concerns during the bidding process (Shattock 1994) that building and development work at Midshire might not keep pace with student needs. Early in 1970 student unrest led to one 'critical incident' in Midshire's evolution. Against a backdrop of agitation, people realised there was nowhere on campus for everyone to gather. A mass meeting was called and students were 'locked in':

> *if ever there was a moment of birth...it was at that meeting. A University is not born when the Privy Council grants a charter, it is born when its members come to realise that they have common interests and a common identity. (Thompson 1970:53)*

From the outset Midshire had designs on industry as a means of generating revenue, being 'explicit about managing such diversity' (Duke 1992:42). This equates with the 'triple helix of academia-industry-government' identified by Etkowitz and Leydondorff (1997:3) expected to be a 'key component of any...innovation strategy in the late twentieth century' (ibid.). In keeping with the manufacturing affiliation of the city one third of the University's first council were industrialists (Thompson 1970). The first VC was 'someone who encouraged money raising by developing links with outside parties' (ADGS). The current VC, installed in 2002, continues this tradition having strong links with the automotive industry.

4.2.2 A Lusty Infant

An entrepreneurial outlook was evident in early academic appointments. Posts reflected a desire not to impose 'academic prescription' but adopted the 'fresh constructive ideas' of a new University (Midshire 2002b). Courses were planned with a 'marked emphasis on inter-disciplinary co-operation' with Business Studies and Engineering looking

'firmly towards manufacturing' (ibid.). Graduate students were an integral part of University life from its inception. The first post-graduates were admitted in 1964, followed by undergraduates in 1965 (ibid.). In 2002 Midshire is flourishing, with over 17,000 students of whom almost 40% are post-graduates (Midshire 2002c).

In the 1980s Midshire responded quickly to the cuts of the Thatcher government by 'resolving to make a new pound for every pound saved' (Duke 2002:113) by the Government. Today:

> *65% of [Midshire's] total income is currently derived from "earning" activities such as self-financing short courses, research contracts, management training centres, vacation conferences etc. (Midshire 2002c)*

Midshire has grown into a strong new University with no sign of its early vigour evaporating. Initiatives are constantly introduced to maintain the momentum of its development and remain at the forefront of social dynamics (Jarvis 2001:107).

4.3 The Manufacturing Group (MFG)

This study focuses on one University Centre within the Department of Engineering, that of manufacturing engineering. MFG is a separate profit centre with a turnover equal to some smaller Universities (DIP). It is headed by a charismatic Professor with a background in automotive engineering, who was 'invited to come here by the then Vice-Chancellor' in 1980 with whom he 'has a lot in common because they are both very entrepreneurial' (ADGS). Prior to this there had been no manufacturing engineering at Midshire.

The Professor was funded by an automotive component manufacturer with the primary intention of establishing post-graduate teaching because 'he felt it was more important to concentrate on post-graduate teaching' (ADGS). He had a 'radically different' approach from many academic engineers because 'he saw engineering problems more from the industrial and company [viewpoint] than the academic perspective' (Shattock 1999:115).

The UK automotive industry invested large sums of money in the 1970s in automation and robotics but 'our competitiveness was reversed – we were still sliding down the league' (DIP). The Professor thought the competitive pressures felt by automotive manufacturers at this time could not be attributed to 'national' causes, but were probably industry specific since 'industries such as pharmaceuticals had prospered without high profile rescue activities' (Bhattacharyya 1993). He thought the problem lay 'not with the tools' being used, but with 'middle and senior management' (DIP). As a result MFG was founded to:

> *Seek and implement solutions through academic-industrial partnerships..., which were to be applied at national level to sectors*

> *such as aerospace, which were fundamentally uncompetitive. (Bhattacharyya 1993)*

One way of achieving this was an integrated approach to managerial education that linked these themes together. It is a 'model based on a joint definition of all [educational] aspects by both industrialists and academics' (Lawrence and Reynolds 1988). MFG was founded to build on the German (Reader 1966, Lorenz 2002) and American (DIP) models of partnership between academia and industry. It has not adopted the model propounded by Giroux and Myrsiades. Partner companies became involved and provided Board level commitment to MFG and its programmes. The principal aim was 'to produce better, more technically capable managers through partnership' (DIP), a model that has been adopted since by several other Institutions (Shattock 1999). By the time the Dearing Report identified 'scope for...innovative approaches to programme design through specialist postgraduate programmes' (1997:201) as a means of closer co-operation with industry, MFG had been operating its innovative programmes for over fifteen years.

MFG was probably the 'first instance of a University giving parity...to an industrial partner involved in course definition and student assessment' (Lawrence and Reynolds 1988), although Jahoda put forward the idea of including 'industry within the boundaries of the system' (1963:202). The first MSc. course developed by MFG was in Manufacturing Systems Engineering [MSE], established as a partnership between leading manufacturing companies and MFG (Lawrence and Reynolds 1988). Over time additional partner companies and courses were added. MFG's modules are now accredited by the Institute of Electrical Engineers for Continuing Professional Development purposes. It is an approved supplier of development for the Association for Project Management, the Institute of Leadership and Management, and the Chartered Institute of Purchasing and Supply [CIPS] (Midshire 2002d).

In 2002 less than 10% of MFG's funding is derived from the Higher Education Funding Council (DIP). Courses are operated at full cost with any surplus being returned to Midshire, a process described as 'academic trading' by MFG's Head of Personnel in September 2001.

4.3.1 Educational Development

The Finniston Report (1980) identified a need for 'radical and fundamental improvements in UK manufacturing performance' (ibid.:12), because of the 'relative industrial decline of this country' (ibid.:7). Finniston recommended adoption of an 'engineering dimension' described as conveying:

> *the interaction of engineering and non-engineering factors in determining manufacturing performance...all the factors and activities concerned in relating all the technological capabilities and expertise of an organisation...to prosper through the sale of its products and systems in the world market. (Finniston 1980:22)*

Finniston's solution was a new educational structure 'framed with particular reference to the needs of manufacturing industry' (ibid.: 94). This proposed a reduction of the subdivision between 'theory, practice and application' (ibid.) in engineering education, and suggested changing engineering teaching to include substantial input from industry.

The Professor was already in discussion with a major manufacturer and the Science and Engineering Research Council about the 'relationship between engineering education and industrial application' (Lawrence and Reynolds 1988). These discussions resulted in funding for an MSc. programme that was, from the outset, perceived as:

> *a joint venture by industry and the University...to provide industrially relevant, broad-based education to equip participants rapidly to become agents of change. (Lawrence and Reynolds 1988)*

The IGDS was created in 1980 (Shattock 1999), offering a modular part-time MSc. in MSE. The main features of the IGDS scheme were and still are:

- Companies, not individuals, join
- It is jointly designed and managed by the companies and the University
- It is continuously assessed, modular and part-time
- Each module is a five-day residential
- Participants are jointly selected and assessed by the company and the University
- The companies make a significant contribution to teaching

The initial philosophy was one of 'go to the customer and find out what they want' rather than 'telling the customer this is what they need' (ADGS). She considers that the most successful MFG ventures 'both academically and financially' (ibid.), have been the programmes that 'companies have really wanted'. Against this positive background of development opportunities in the early Thatcher years, MFG prospered.

In 1981 two manufacturing companies had nominated 55 participants. By 1987 the programme had grown to 14 partner companies with over 120 delegates and 23 participants from associated companies. There was a Management Committee determining matters of policy that included seven large manufacturing companies.

One objective of MFG was to break down the perceived boundary between senior management expectations of junior and middle managers and the 'general performance' of those managers. This boundary has been called the 'Capability Gap...the barrier to "conducting" improvement actions from concept to the workforce at large and hence to the workplace itself' (Reynolds 1993). Flower describes this as a 'capability curriculum in which all the activities undertaken by the learner operate in harmony' (1986:171). This capability gap reflects the inability of middle management as a whole to:

> *create managers who can deal with the complex and inter-related issues of business, technology and operational management; who can*

> *take key decisions without expensive, paralysing studies...who can face up to global issues of design ownership and international sourcing. (Reynolds 1996)*

In 1996 the DIP expanded on this theme by identifying the need for sustained business performance with an 'Integrated Business Strategy using commercial, operational, technological, people and skills change' (Midshire 2002e) approach. He felt implementing such a strategy required

> *technological and operational innovation, board level commitment, well trained staff to make the changes, retrained middle managers, Research and Development [R&D] to remove technical barriers, technology transfer and continuing support. (DIP)*

To achieve this it is essential to have the commitment of partner companies who are willing to share knowledge and innovation with delegates on the programme (DIP). It requires a management scheme where industrial partners are involved in monitoring and developing the programme. MFG achieves this by holding working parties where partner companies are invited to share current industrial developments and become involved in module development.

4.4 The MSc. Programmes

The stated aims of MFG's present Masters Courses have changed little. They are designed to develop professional managers, engineers or scientists who work in manufacturing and engineering businesses. Such businesses need to consider their activities as an integrated operation from design to final assembly and marketing. This means focussing attention on core value adding areas: markets, operations and technology (Midshire 2002e). The MSc. in EBM adopts this framework, requiring students to undertake modules that develop their ability in these fields.

Modules are offered in full- and part-time mode increasing flexibility. In 2003 forty modules are available, contributing to MSc. courses currently on offer which include: EBM, Electronic Engineering Business Management, IT for Manufacture, International Technology Management, MSE, Process Business Management and Quality & Reliability [Q&R] (ibid.). Programmes are now run in the UK and several overseas centres.

Whilst MFG has diversified, the current part-time MSc. courses still retain the initial common objectives, which are to give students an understanding of how engineering, technical and business information is used in industry; to develop students problem solving and decision making abilities by providing an understanding of the technical, financial and organisational factors involved in industry; to give students an understanding of current capabilities and trends in their chosen specialism and to provide students with the expertise to design and implement systems in their chosen field.

MFG has in mind a typical student when planning modules. Without this there might be discontinuity between the needs and perceptions of the student, the partner company and that of MFG. To address this issue the existing skills and experience of potential students were analysed (DIP). The 'ideal candidate' should have 'real work experience, so they can understand some of the frustrations of the business world' (DIP). They should have a 'proper understanding of what a broadening approach entails and what benefits it should bring' (DIP). This might appear a prescriptive requirement for an MSc., but when questioned as to its feasibility, the DIP clarified his view with 'I am hoping that they are responsive towards that idea'. He continued:

> *as for pivotal moments I would expect a few of those, but I am hoping that two or three modules into the course they will suddenly get intoxicated with the real benefit they can absorb and bring to their business through this programme. They suddenly see being at MFG as being more valuable than being at work. (DIP)*

The MSc in Engineering Business Management

EBM is the largest MSc. course in terms of participants, and the part-time programme is the focus of this study. The course is structured such that delegates attend twelve discrete five-day residential modules in two years. A typical working day is from 9.00am to 9.00pm, finishing on Friday afternoon. This ensures forty hours of 'directed tuition' (Midshire 2002e). A similar amount of time is spent on PMAs, which are typically five thousand words long.

In keeping with the central framework each module has a business, operations or technology focus, and participants are required to take at least three business and six operations or technology modules. Fundamentals (Induction) and Financial Analysis and Control Systems [FACS] are compulsory, as is BP & SM, which is taken at the end of the taught element of the course.

Participants are usually graduates with an engineering or scientific background, or graduate-equivalent with significant work experience. It is hoped they will have relevant industrial experience and because they are selected by their employer that they will be 'a manager or technical professional needing balanced business, engineering and operational capabilities' (ibid.) for their professional development. The MSc. is thus seen as a vehicle for developing managers.

During Fundamentals, careful module selection by participants provides common links between business, operational and technical themes. Thus delegates can choose a pathway that meets their specific needs and interests. It could include widening of knowledge base, increased depth of knowledge in a specific area or selection of modules covering areas of weakness. All these combinations were evident among delegates: 'When I first started I really just tried to do modules that I knew nothing about' (A2); to 'I am quite interested in technology... so I chose more technology modules' (G2).

In addition to attending modules, nine acceptable PMAs must be submitted, with the remainder meeting a minimum standard. For each PMA delegates are expected to apply core module content to an issue within their own organisation. Saltiel sees it as important that 'reflective discussion of practical experience rather than the teaching of a body of academic knowledge' (2003:106) is taking place when learning is experiential. A major benefit for companies is that participants are able to provide an early return on company investment because of the practical nature of the PMAs.

To complete the MSc. participants must also submit a relevant project identified by the employer. The project contributes 50% towards the MSc. and is jointly supervised and assessed by academic and industrial supervisors. There is an oral component to the dissertation, which includes a presentation to internal company staff. Thus the programme offers a combination of academic rigour and practical application that is almost unique.

4.5 Life Cycle of a Module

In this section I detail the life-history of a module, from the perspective of both tutor and student to give an insight into how MFG operates.

4.5.1 Life as a Module Tutor

Every module is the responsibility of a module tutor who may have a portfolio of three or more different modules, each of which can run several times a year. Other modules in a tutor's care might include modules for bespoke courses; full time modules or those not offered at MSc. level. Therefore a module tutor needs to be sensitive to the requirements of the differing educational needs of each programme and its participants when planning a module. Dennison and Kirk consider 'the main job of the tutor is to help organise the learning....The range of responses to a formalised experiential learning situation will range from keen acceptance to grudging inclusion' (1990:9).

MFG operates throughout the year and the MSc. commences several times allowing a roll-on roll-off approach. Modules may have four to twenty-four or more participants. Each module will have several presenters 'including academics, consultants and practitioners' (Midshire 2002e) who bring different viewpoints to the module. Every module combines 'theory...application and specific...examples' (ibid.) from relevant industries. Delegates assess every presenter, and session for content, depth, pace and style. An independent quality review is completed at the end of each module. This serves as a benchmark for students and exerts pressure for tutors towards continuous improvement.

The planning horizon for a module may be six months, with forward dates reaching two years hence. Any one module will not be complete until three months after delivery, so module tutors have modules at different stages of gestation at any one time. The module tutor will work from the module outline to develop a course that maximises several things: utilising known internal or external presenters, a range of presentation and

delivery modes, variety of depth and breadth of content, the most logical structure and flow possible within known constraints and overlap with other modules.

A module tutor designs the module to introduce an unfamiliar cohort of students, with unknown and differing knowledge levels, to the topic. The module will have a 'shape' or a story to tell. Characteristically the first day of a module may be scene setting with academic input: 'The first day is always a long day' (A1). Another facet of module design is how to engage delegates from the beginning, and having gained their attention (Brookfield and Preskill 1999:67), how to retain it. Some students may be attending just to complete their module count and have little appetite for the content, others may be attending their first module and be unsure of their ground. Thus the module needs to have a varied pace, content and delivery method to capture and keep students' attention.

Most sessions will involve some formal delivery and possibly a syndicate exercise with delegate feedback. Howe considers that 'at the start of a sequence of work...discussion can assist...in helping to identify issues for further exploration – brainstorming' (1988:20). The session objectives will be outlined at the beginning and key learning points summarised at the end.

Module tutors sometimes opt for a 'U' shaped model for a module (P1), where the amount of academic input is higher at the beginning of the week. Interaction is encouraged, and having students sitting in a U shape increases the opportunities for engagement and allows for an all channel communication network (Crawford et al. 1997:172). Theoretical input might decrease and industrial involvement increase as the module progresses. Towards the end of the module there may be further academic input – possibly introducing 'next steps' once the industrial demonstrations have been absorbed and finally some input from participants as to where they can develop and apply this knowledge once the module is over, possibly within a PMA.

Once the outline content and timetable is formalised, a juggling act then begins to balance the busy lives of presenters with the needs of students and the module. Industrial speakers from a distance away may give up most of a working day to present a 1 ½ hour session. With preparation as well, this is a big commitment that module tutors need to respect.

Prior to the module, the tutor briefs each speaker about expected content and the form of delivery, where they 'fit' within the module and anticipated delegate expectations. Presenters may only have one session to introduce themselves, engage with the students, get their learning points across and possibly involve delegates in a syndicate exercise. For the presenter this can be a challenge. Speakers may not know in detail what happens before or after their presentation, the timetable may have altered, and the group may be diverse with different dynamics from previous groups. Facilitators should have the confidence to let discussion flow in different directions, but have the confidence to know when to pull the debate back on track. Presenters may be passionate about their topic and want to expand on it, but module tutors must maintain the integrity of the module.

The module begins with the module tutor outlining the programme for the module. Participants may be asked to introduce themselves and identify what their objectives are for the week. This in itself can be a daunting task for reticent engineers (Beder 1998). The module tutor may know nothing about the delegates apart from their employer. The tutor has a few seconds to judge the atmosphere, enthusiasm and interest of the wide range of participants before starting the module. Add to this the span of ability, amount of interest and differing knowledge levels of participants, and a tutor can have a difficult task.

On occasion kick starting a module can be likened to pushing a boulder uphill, or it can be an easy ride. The tutor needs to be vigilant lest the tempo slows at any point during the week. The module tutor will divide the students into syndicate groups for exercises, trying to ensure that participants are well mixed. Changing the groups during the week is one way of regaining the tempo of the module and reducing any tensions that arise. The module is run along conference lines, with manuals containing all course notes available at the start of the week. It runs strictly to time, hence the common usage of the term delegate. Another oft-used word is participant because of the amount of interaction expected.

The module ends with a summary and independent review where the initial objectives are revisited. Throughout the week the module tutor will have acted as host, facilitator, organiser and general fixit, introducing speakers, summarising at the end of sessions, linking the disparate strands together, re-arranging the timetable to accommodate late changes and positioning any amendments so the 'story' is not lost; as well as acting as academic expert. It is a multi-faceted role. After the module, delegates may contact the tutor to ask questions relating to topics in the module, or more commonly to raise issues about the PMA.

PMAs are submitted six weeks after the module. Pressure of work is not seen as a valid reason for an extension, timely completion is seen as part of the MSc. discipline. Module tutors must mark and return PMAs within four weeks and as part of the quality process include a detailed commentary on the work. Developing and delivering a module can be likened to Wideen and Andrews' description of a 'professional who extends beyond the journeyman and craftsman to become a master teacher' (1984:198). Contact with a module is therefore a lengthy process, and given that a module tutor may have several different modules operating at any one time s/he needs to be adaptable and able to handle these Bucky balls.

4.5.2 Life as a Student

Prior to arrival delegates are sent a module outline, a generic timetable and any relevant joining instructions. This will give an overview of what is to come. Occasionally the joining instructions may ask participants to bring work-related examples with them, such as a supply chain issue for use during the module. A student will arrive at MFG on Monday morning, sometimes after a very early start.

Participants walk into a lecture room, laid out with desks in a horseshoe and sit wherever they choose. For some people this can be daunting, verging on intimidating. There may be no-one in the room they know, or people whom they dislike. The group may include new graduates, research engineers [EngD.], junior managers and people qualified by experience. There may be delegates who have come for one module as a short course, who know no-one and nothing about MFG or the programme.

MFG uses Fundamentals to orientate participants and reduce any undue stress this could cause, but it does still present a challenge to many delegates: 'I sat in the room and I must admit I thought I was in the wrong place' (A2). MFG encourages delegates to take FACS as their second module. This should ensure they are with some fellow participants from Fundamentals to alleviate any tension.

> *The first module I went on was horrific! It was awful.... There were only four of us on the module, and the other three were on their ninth, eleventh and tenth modules, and they all knew each other really really well.... I felt very isolated. (A21)*

When questioned about why she had continued A21 did reflect that she 'never give[s] up'. Her earlier experiences on Fundamentals had facilitated her willingness to continue and complete the modular part of the course.

Being a student taking EBM has many facets. Students have been pre-selected to attend the course by their employer. Participants may see this as a privilege, but selection can impose pressure to succeed. There is the disruption of being away from work when attending modules every few weeks with the ensuing work backlog: 'I have been able to organise my staff so that I have a strong team, and they don't really need me any more' (G5). Being at Midshire is followed by completion of the PMA often while at work. For some, completion in work time is impossible, adding further pressure on personal space for these individuals.

There may be the strain of studying unrelated subjects every few weeks. Topics as discrete as Logistics or Creative Design [CD] could follow Leadership [LSP] or Industrial Engineering [IE]. Depending on participant interest subjects might be indigestible, exhilarating or uninspiring and spacing might be uneven resulting in overlap of PMAs. Within a module sessions may move rapidly between academic concepts and complex formulae through to practical application using top-down or bottom-up approaches. Unlike more traditional teaching students have little time to absorb, synthesise and reflect on the content.

Long days spent behind a desk are difficult for people accustomed to moving around a production line. As managers they are accustomed to having a degree of autonomy over what they do and when. This loss of control can cause problems. Each new presenter will have a different style, background and emphasis. Delegates need to familiarise themselves with this and the industry sector, position what they are being told and absorb the learning points, before the cakewalk moves on, lest they are left behind.

Syndicate groups also have their own dynamics. Here personal unease with others may reduce learning from the topic. Syndicate groups may be re-arranged, changing dynamics and taking participants out of their comfort zone. In Fullan's (2001) opinion students are more likely to learn something from people who disagree than from people who agree. Some delegates spend much of their lunch-hour attached to mobile phones, work is rarely far away. This is not conducive to learning.

Good time management is essential. Careful planning of work related duties to allow space to attend modules and recover the work backlog is essential. Staff training to handle ongoing issues while delegates are absent may be necessary. Time attending modules means time away from family and friends, and discipline is needed when completing PMAs back at base. This MSc. demands exposure to unfamiliar ideologies and an ability to be receptive to change. Delegates cannot hide away from their peers and tutors, interaction and participation is a key feature of this programme from day one.

4.6 Summary

This chapter has set the scene for the learning environment into which the students are immersed when they embark on an MSc. at MFG. It has given an insight into the background and development of Midshire from inception to the present day and outlined the course that is the focus of this study. An overview of how the course operates and modules are delivered provides a glimpse into what is expected of students in order to be successful. It provides a backcloth against which the details given during participant interviews, which are the subject of later chapters, can be positioned.

CHAPTER FIVE

5 Fish Out of Water

This first fieldwork chapter considers the diversity of participants in the study. It gives an insight into the attitudes of participants and looks at the diversity of background experience of the group. It addresses issues arising from interview questions relating to background and participants' initial module choice and provides a benchmark against which critical perspectives are developed in subsequent chapters.

The chapter introduces change and how it impacts on the lives of some participants. This serves as a setting for the critical elements that follow, when respondents' views become more prominent as identification of critical issues unfolds. With so many facets, and numerous interviews, inevitably some individuals are given more emphasis than others. Reasons include some respondents being more forthcoming and some more reflective than others.

The chapter begins with a discussion of students' educational and industrial background. The analysis moves from clear-cut matters such as qualifications to 'descriptive' detail, which is supported by extracts from relevant interviews. These are intended to provide an insight into the mindset of the delegates. Distinctive categories such as type of qualification have been collated in an Excel spreadsheet (Appendix 3) to provide an overall feel for the study group.

I have tried to strike a balance between giving equal weight to each interviewee and allowing those with 'interesting' stories to be more cogent in places. As an interested bystander this may mean that my ideas have influenced the choice of extracts. Reasons for selecting specific comments include: to ensure the structure of the group is clear; to encompass the range of elements put forward by interviewees and to identify relevant categories of critical issues.

5.1 Educational Background

In this first section I outline the educational backgrounds of the two sub-groups. The study group has a broad spectrum of qualifications making subsets of qualifications difficult. Twelve of the interviewees had an apprenticeship as their first qualification while ten had a Bachelors degree. The remainder were qualified by experience. Of the Apprentices, four had continued their education through O & HNC/D to first-degree level, and two had professional qualifications, CIPS and Certificate in Production & Inventory Management

Some described themselves as graduate apprentices: 'I started off as an undergraduate apprentice within (Aerospace Company [Aero Coy.])' (G4). People who described themselves thus were included in the Graduate category, rather than the Apprentice category, which did create a distinct division between the groups. The primary differentiation therefore was having taken A levels.

Two Graduates had unrelated Degrees [NRG] one in Economics and one Sports Science; a further three were licensed engineers. One female also had a teaching qualification and a professional qualification in leisure management. Only one participant had no formal qualifications.

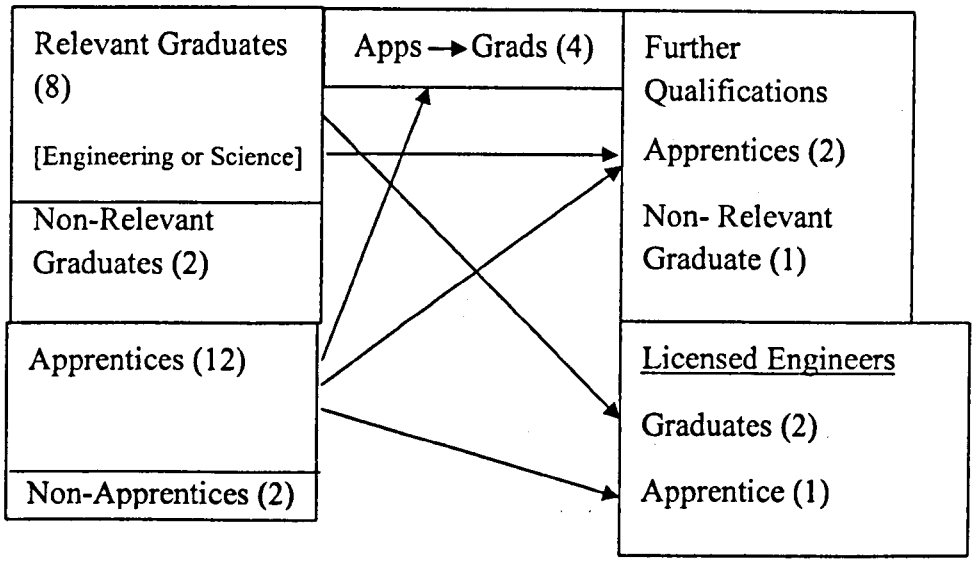

Table1: Origins and Numbers of Participants.

5.2 The Apprentices

The group of twelve apprentices was all male. Their ages ranged from 30 to 50, with an average age of 37. Three of the group had progressed through MFG's post-experience diploma [PED] course. Further, three of the group are now directors of their respective subsidiary company's, one each from automotive, automotive supply and aircraft maintenance, including one with a PED. All the apprentices were willing to tell me about their background and early working life. Formal schooling for the Apprentices ended at sixteen. For them, delineation was clear between school and working life:

> *Left school with several O levels, did City and Guilds, then had no other education at all for eleven years. (A11)*

> *I started my working life on a building site as an apprentice fitter, then progressed to be an apprentice technician. (A6)*

Some Apprentices implied their secondary education ended abruptly after GCEs or CSEs as appropriate: 'my secondary education history ended in 1983 when I decided to leave school at sixteen....Back when they were harder!' (A8). This suggests A8 needed to vindicate his scholastic achievement now he was taking an MSc. A8 was not alone in having this attitude towards his secondary education; others were also dismissive, perhaps feeling the need to absolve their later achievements.

> *Left school with not a lot. Two O levels, which I had to pay for myself, because my school didn't think I could do them....O levels in*

> *metalwork and technical drawing. Both sort of engineering type subjects. (A3)*

A3 implied his O levels he had led him towards engineering. This might have been because they were the only formal qualifications he had. In a similar vein A2 said: 'I had a choice of going to University, or going into an Apprenticeship' adding emphasis to this defensive stance, by saying 'I left school at sixteen'. It is possible that his memory may have changed over time (Rosen) regarding his 'choice' of an apprenticeship.

There were also two interviewees who were not apprentices who worked for the same automotive supply company. Each had interesting stories to tell. One had been in the Royal Navy for nine years. He made a hesitant start: 'I have no formal... I left school with three O-levels and then joined the Royal Navy' (A22). The other began our conversation with: 'trained as a bi-lingual secretary' (A21), not mentioning school at all. This reticence was evident on occasion throughout the Apprentice group, it rarely occurred with the Graduates. It seems that in the early interview stages there was a distinction between the language used by Apprentices and Graduates.

5.3 The Graduates

There were ten graduates in the study group, of whom three were female. Four males had gained an HNC/D prior to embarking on a degree. The age range of this group was smaller than the Apprentices, being from 29 – 42, and at 35, their average age was younger. For the Graduates, education ended at twenty-one plus. They seemed to apply strategic thinking over career moves, perhaps by being more single minded.

> *I did an engineering degree and then I'd spotted this course and asked to go on it and whilst at first they weren't too keen, eventually they coughed up the money. (G1)*

As with the Apprentices, the entire group was willing to talk to me, but were hesitant about the transition to a working environment. It was as if life did not begin until Graduation: 'After leaving University I went to work at...' (G4); 'On leaving University I worked as a Project Engineer' (G10); and 'joined [Aero Coy.] as a systems analyst straight from University' (G8), were typical rejoinders. Sometimes school education was dismissed almost entirely: 'Prior to that I did A levels, I don't know whether you want to go back to that?' (G2). One NRG mentioned 'professional qualifications', and added as an afterthought: 'before that I spent a year training to be a Physical Education teacher' (G5).

5.4 Internal / External Industrial Background

In this section I examine the industrial backgrounds of the two groups and initiate some discussion about attitudes. Analysis of all informants revealed that everyone is now employed in multi-national or large companies but seven had worked in the small and medium sized enterprise [SME] sector, as defined by the Companies Acts 1985. This

confirms the MFG target market as being 'junior managers capable of further development' (DIP). It is unlikely that the SME sector could support this level of training for junior managers. Five of the Apprentices had worked for the same employer since leaving school. For one that working life spanned over thirty years.

	Automotive	Automotive Related	Aerospace & Related	General Engineering	Total
Apprentices	5	5	4	0	**14**
Graduates	1	2	5	2	**10**
Total	**6**	**7**	**9**	**2**	**24**

Table 2: Type of Industry Sector in which Participants are employed.

The spread of industry sectors indicates that the student base is now wider than when MFG began. MFG's historical links with the automotive industry seemed not to have changed for some: 'It is mainly round the car industry' (G7). With over half the group working in automotive and allied industries, this seems a reasonable perception.

One key difference between the automotive and aerospace industries is that aerospace is dominated by two companies with a wide span of engineering activity including electronics, avionics, defence and marine engineering. The automotive industry in the UK has several manufacturers producing a uniform globally recognised product. Applying fuzzy logic it is not practical to produce half a car, but some electronic systems from aerospace can be used in other circumstances, and because of complexity, production may be shared between businesses.

One objective of this MSc., described by the DIP is 'to open participants' eyes to alternative business issues'. G7 again: 'the car industry is totally different to our industry'. Hopes of achieving the wider view were also apparent from G7: 'it is changing – a bit.... I found it very exciting'. His observation that the course is dominated by the automotive industry, both in participants and presenters, is not clear-cut, given the diversity of informants in aerospace and general engineering, but it provides an early indication of a change in attitude by G7.

5.4.1 The Apprentices

The industrial experience of the Apprentices included internal and external career moves. As a group, they had made several career moves, both prior to and during the course. Almost half had experience of working in SMEs prior to their current employment. Working in small companies allowed for career mobility in their early working lives.

> *Went to work in a company.... Got the job off the radio, within a week of leaving school, making heating ventilation, and sheet metal fabrication... then another job at (a general engineering company [Gen.Eng.Coy.]). I worked there for three or four years. I finished my ONC and started my HNC. I then got a job, at an (Automotive related company [Auto.Rel.Coy.]); my first collar and tie job, as an estimator. (A3)*

Three Apprentices had spent all their working lives with the same employer but had not been restricted by career moves. A4 described how he changed from being 'a pattern maker' through being an industrial engineer where at first he would 'go out and implement' with 'a team of nine people' to becoming a manager, 'target setting and monitoring' with 'only me now'. Change can take many forms (Bass and Vaughan), evolution within a company being one way. In A4's situation, although the business was the same, ownership had transferred from the UK to Germany. From his perspective change had a big impact on his changing role.

> *They've changed the way they do things...well the big problem is we have lost a few of our people onto the shop floor, it's their role now to actually implement, but they don't do any target setting. (A4)*

Another apprentice, who had worked for the same employer all his working life, described change as playing a more significant role in his career: 'from being one day in charge of 600 people to the next day having absolutely no staff' (A9). His change from 'running a huge empire' through to being part of 'a conceptual team of planners and materials handlers' must have had an impact on his working life. It did not stop there. His next career move was from the conceptual team 'to becoming part of a small management team' with a different management structure that had to be handled in his 'continually shifting business environment'.

Change of job for one apprentice led to returning to his original employer. There was one graduate to whom this had also happened. In each case the employee had been 'approached' (A7).

> *Worked some minor miracles on production rates, inspection quality etc., but made the fundamental mistake of developing systems which didn't require me to run them - consequently thanked profusely for my efforts, and made redundant after twelve months...About twelve months after being made redundant, [they] approached me to ask if I would go back. (A7)*

For A7 the change to another employer had been his own decision, but comments regarding his resulting redundancy suggest an inbuilt confidence in his own ability. It cannot be easy to return to a previous employer in these circumstances.

Of those Apprentices who had changed employer, the process was one of gravitation from small business to larger companies. A3's career development was from a 'back

street company, back of the canal' through one 'who used to make spanners' to (Automotive assembly [Auto.Coy.]) at a time when they were introducing the new vehicle'. A3's career progression mirrors the complexity of the products he was involved with manufacturing. This is a frequent career path for the Apprentices (A1, A5, A6, A7, and A11).

The two non-apprentices in this group were also interesting. After leaving the Navy, A22 took one A level while working as a 'process operative', then worked his way up to Information Technology [IT] manager with a textile manufacturer prior to being made redundant. The resultant career change led him to his present company as IT co-ordinator. His current role is logistics manager, having 'deliberately chosen' to move out of IT 'because it was not a challenge' although by his own admission he 'is not a people person'. Interestingly A22 did not take the easy option here, suggesting he was already looking for a challenge and that he was aware of his strengths before joining the MSc.

A21 had remained with her first employer since completing her secretarial training. She joined as personal assistant [PA] to the Managing Director [MD], but 'very quickly got fed up with that and was sidelined into the quality department' (A21) where she took an HNC in chemical engineering. This major change happened prior to commencing the MSc. A21 must have been successful; she is now responsible for quality. Subsequently she decided to 'do something else' and found the MSc. course.

5.4.2 The Graduates

The industrial experience of the Graduates also included internal and external career moves. Half of the Graduates had worked for the same employer all their working life. Of these all but one were still under thirty so no specific conclusions can be drawn. Two graduates working for the same firm had different experiences to relate. G3 noted 'I am still doing the same job that I did when I started' while G1 described having three different positions within the company, adding 'this is the fourth job I have been in' since starting the MSc. He thought this was advantageous both from an experience point of view and in terms of 'sharing the cost amongst different departments'.

Of those who had changed employers, two had also changed industry sector (G4, G5). When compared with the Apprentices this implies less sector mobility, but greater job mobility. The three women graduates provided every combination: staying with their first employer; changing employer and industry sector; and one complete career change from public to private sector, the only person to have made such a dramatic move.

Some Graduates had interesting anecdotes about career moves. There was usually an impetus to change, including being thwarted in career aspirations, and not being allowed to join the MSc.: 'thought I have got to look elsewhere to pursue my career' (G4). She decided she would 'quite like to do a second degree...it just seemed a natural progression'.

G4 started her MSc. whilst at [Gen.Eng.Coy.], but found the 'turbo-charged atmosphere' did not suit her so decided to move on. She found a position with her current employer but felt so strongly about completing the course that she negotiated an agreement to 'carry on with the MSc.'. From the student perspective the fact that a new employer is willing to cover the remaining cost of the course may act as a confidence booster. As with many things there was a trade-off: 'They wanted me to take a nine month sabbatical so I could settle into this role' (G4). From the employer's perspective this was an acceptable risk. G4 might not have been the right person for the job, and the cost of completing her MSc. was considerable. G4's determination to complete the MSc. alongside her need to change jobs demonstrates adaptability both to her work environment and her own career aspirations.

Several Graduates returned to their industrial sponsor on graduating (G1, G2, G3, G7, and G9). This had not always been intended:

> *Completed the degree course, with no real intention of going back to [Gen.Eng.Coy.]. I got an offer to go back to [them] which was better than some of the other things I had been offered, so I went back. (G2)*

With almost half of the Graduates returning to their sponsoring company after graduating there is evidence that employers use sponsorship as a way of recruitment. It also implies a difference in attitude from the Apprentices and an easy route for graduates into the workplace.

5.5 Attitudes and Awareness

I wondered whether there were attitudinal differences between the two subsets. Had the Apprentices, with their greater emphasis on training, a different approach to the educational opportunities available to them? I expected the educational background of the Graduates to encourage an interest in acquiring greater knowledge, and that they might have a wider outlook on life.

5.5.1 The Apprentices

The attitude of some Apprentices toward their origins suggests an unassuming approach to life, implying a lack of confidence thus far.

> *I was taken on as manufacturing engineering manager for the new product. After the product was introduced they asked me to stay on to make sure it was OK and then they asked [if I] would take over as Director designate for the manufacturing facility, which was a bit of a surprise. (A3)*

A9 had a strong desire to participate in my research. Arranging the interview was a long process due to mutual work commitments but he was determined to contribute. A9 has worked for the same company for over thirty years. A9 was one of three participants who had progressed from the PED to the MSc. His achievement, in length of service,

working for the same company, and in becoming a director is unique amongst the study group. Had this reduced the level of awareness of his origins? This was not so.

> *From humble backgrounds in that I was born, I guess you could describe it, to a working class family, - secondary school education. The village that I lived in, people did not go on to higher education. Not the done thing. It wasn't even something that was talked about. So it was finishing CSEs in those days, going and getting a trade and working from there. (A9)*

Some apprentices demonstrated an ethos of work, with an appreciation of what opportunities were being offered to them. Lack of money is a big incentive to work hard, and childhood hardship can have a bearing on later life. A4 had also progressed from the PED and worked for the same company all his working life. He has a self-belief and unassuming manner that belied his determination to take advantage of opportunities offered to him wherever possible.

> *I've always done something, from the age of about eight really, even if it was just helping the milkman, working Saturdays. I started an apprenticeship in 1967 as a pattern maker.... My family didn't have much money and there was always: - nose against window, if I helped, I'd get sixpence, all learning for life to me. (A4)*

Money was not an important factor in A3's life. He realised money would follow on from achievement.

> *Prospects wise I think quite early on the money aspect didn't matter to me – I knew...the financial benefit would come. I had friends who were earning tons more money than me.... I just knew that that wasn't the way to make a safe secure future for myself. I had to do something more than that. (A3)*

Ability to address an unfamiliar experience fits in well with the Apprentices' attitudes, which may be due to their diverse apprenticeship experiences of 'measured competences' (Pring1995:58). A11, having had no formal education for eleven years, applied for a job as a team leader. When asked what prompted the decision to progress he replied 'I could see things were changing...from authoritarian type management...and I knew I had the ability' (A11). This implies an early awareness of change and that their attitude to mobility and risk-taking may be linked with confidence.

The work ethos was also evident with A5. He described progressing from doing 'quite well' as a fitter's apprentice through 'being sent' to evening classes, to gaining 'a first class degree in manufacturing engineering' (A5). This unassuming description understated his achievement and tenacity that was a feature of several Apprentices (A1, A2, A4, A6, and A11).

> *I actually believe you can do anything if you put your mind to it. That's possibly why I am on this course; I never had the opportunity when I was younger. (A4)*

The thirst for learning evident in these apprentices suggests an in-built sense of achievement, self-worth and a determination to succeed: 'I did see it as a great opportunity' (A1). This may have been brought about by never having experienced further education and a desire to sample the forbidden fruit.

5.5.2 The Graduates

Amongst the Graduates there was the occasional sense of uneasiness about having become an engineer (G2, G3, G7, and G10). Was engineering a suitable career for a graduate? Further questioning was needed to overcome this reticence and was sometimes followed by an admission that engineering was a wise career choice.

> *When I started out I wanted to be a draughtsman.... They said, "You should do technical drawing". So I went to a technical high school and they said; "you ought to be an engineer or an architect". So I arbitrarily chose an engineer. But I have always been interested in mechanical things, and how things work, problem solving.... I don't know whether I wanted to be an engineer, but I ended up being an engineer. Actually it is good fun. (G7)*

None of the Graduates discussed their early childhood or origins. It seemed that it never occurred to them. The language of most Graduates suggested that they placed more importance on their expectations of their employers in providing a career path for them.

> *I'd spotted this course and asked to go on it and at first they weren't too keen....Instead of just being aware of that particular industry and that particular company it gave me quite a wide understanding of what other companies did, how they did it and what they thought were good practices. Brilliant really for getting a breadth of experience in terms of the different types of companies, different styles of management, the different things that other companies have been involved in. (G1)*

Sponsorship could explain expectations of their employer regarding career path. Some Graduates (G1, G2, G3, G4, G6, G7, and G9) were sponsored at university.

> *I applied to [Aero Coy.] for sponsorship, 'cos that was a good way to get practical experience. They sponsored me, so I did a year working for them. Then I went to X University for three years. (G3)*

Of those who were sponsored, company mobility occurred at the same rate as those who were not, suggesting that sponsorship did not restrict early career development. No one mentioned loyalty or a sense of responsibility having received sponsorship. Once they

had embarked on the MSc. career development was very much at the forefront of their mind.

> *One of the major factors, which I believe influenced my attending Midshire, was my interest and enthusiasm for the programme. I was incredibly keen to do it as I had heard so much about it from colleagues who had attended. I wasn't going to accept anything else! (G8)*

During a merger when G2 was about to start the MSc. he was unsure his employer 'would still be able to honour the [company] offer to do the MSc, but...they have sponsored me' (G2). There was some evidence of hesitancy from G2 but his doubt was short-lived. Determination to succeed was part of the Graduates' philosophy. To succeed it is necessary to have an element of mobility and be willing to take risks.

To summarise, the Apprentices imparted a sense of wide-eyed expectancy about their anticipations of the course, willing to try most things and open to new ideas. The Graduates appeared to be less eager to learn, slightly more selfish with just a hint of arrogance (DIP) on occasion.

5.6 Mobility and Risk-taking

Here I describe some career moves, and attempt to show how each sub-group responded to diverse situations. Early educational and industrial opportunities might emerge differently. The Apprentices with their lack of formal education might react differently to academic rhetoric from the Graduates, whereas the Graduates might be less able to cope with the unfamiliar, having less experience of the real world.

5.6.1 The Apprentices.

Seven of the Apprentices had changed companies since starting work, and of these six had changed industry sector. Mobility for them was possible during the early stages in their career, perhaps because they were lower down the career ladder. The majority of Apprentices indicated a flexible approach to their working lives almost from leaving school. There are indications of willingness to move around as a means of gaining both experience and qualifications.

> *My working life started off as a [mechanical] apprentice.... I followed that with electrical training to become a qualified electrician. (A1)*

A3 showed a similar need to move on.

> *After a few months...felt that there's got to be more to life than this. I was sixteen years of age and there I am working in a **** dirt hole.... Worked through HNC and Degree, and when I left I was project manager...I had ten good years there. About five years ago I decided I needed to try something else. (A3)*

A1 was proud of his mobility. He 'chose to go independently' and not to follow the safe option. When offered the choice of a company sponsored, or multi-company DMS, he chose the multi-company one because 'the mix of people... would be a huge benefit' and would expose him to 'different areas'. When asked about his current position A1's response mirrored this desire to mix:

> *I have moved around [Auto Coy.].... I have [been] in General Assembly; ...CIP and Kaizen...but I have a number of other activities, and nobody can tell me what my job title is! I haven't got a problem with this, it gives me a wider scope; larger working area, and I quite enjoy it. (A1)*

This desire to mix with other cultures is raised more by the Apprentices (7) than the Graduates (3) and provides further evidence of their desire to embrace every available opportunity.

Implicit in A9's description of his early life was a desire 'to succeed in something but I wasn't sure which way to go'. There are two routes in aircraft engineering.

> *One was going down a road of engineering licences...the practical side of keeping aircraft flying from a compliance point of view. The other half was going down an academic route, which was sort of design, and technical areas I guess. I chose to go down the licensed road, which was exciting and demanding.... It kept you very close to aircraft and at the end there were professional qualifications that would carry you through your whole career. (A9)*

A9's decision to stay with his first employer resulted in him running a regional airline. Mobility within his own company was also a theme for A2. He had been asked to go to procurement for three months 'to help out', and was 'still there after twelve years'. Whilst this suggests lack of mobility, he had never lost sight of his career, thinking he 'needed more of a rounded view of business' in spite of starting 'in operations chasing the bits'.

During his time in operations, A2 had completed CIPS, with people from his own company, and the NHS. When 'given the choice of an MBA at [X] or an MSc. at Midshire, I decided to come here' (A2). This fits well with his philosophy that doing an MSc. at MFG would provide a diffuse spectrum of opportunities. Not choosing the safe option of joining his peers emphasises further the Apprentices' spirit of adventure. A12 was looking for something that was 'across technical, business and managerial' perspectives. For him company policy was 'MSc. at [X], MBA at [X]' so he had to:

> *push to go somewhere else, very [Auto Coy.] people, very like minded and I think that is one of our problems...because you end up with the same type of people, and you end up cloning the same type of person. (A12)*

A12 continued by saying that his decision to join MFG had been vindicated because he had been able to 'use and have practical application of nearly everything from day one, unlike some of [his] colleagues'. He felt that although MFG used different industries the course made him apply them in his 'own workplace', providing confirmation of the MFG approach.

A21 was still in the same job as when she started the MSc., but 'the role has changed...including a lot more business process issues' (A21). She studied the course content rigorously before committing herself to the Q&R stream. When asked if the MSc. had met her original expectations, A21 observed that the course was 'far far wider and better' than she had 'anticipated'. This supports the notion that 'practical application of demonstrable theories' (Reynolds 1994) enhances learning beyond each individual component.

5.6.2 The Graduates

All but two of the Graduate group had changed job function during the MSc., indicating a greater degree of job mobility and perhaps a different attitude towards risk-taking. Sometimes movement was at the behest of employers: 'I was asked by the Vice President of manufacturing to be his PA' (G8). G10 described moving through three very different job roles during his MSc.

> *I left R&D and project managed the transfer of [X] Aircraft from [Aero Coy.] when we closed the site. I became responsible for defining the [xxx] Strategy.... I then had the responsibility for co-ordinating the entire tooling spend; however this was merely a transitional role. (G10)*

This suggests some degree of confidence at being able to cope with change but in keeping with Jahoda (1963:194) there was still the quest for broader experience. G2 had a chance to study with colleagues: 'so, that was the thing, to do an MBA, or the MFG MSc.'. He asked colleagues who said 'do the MSc.' therefore G2 opted for the more expansive approach of the MSc.

Sometimes Graduates appeared lacking in strategic direction: 'My role has not changed significantly since starting this course' (G9); and 'I didn't know I was going to be in Germany for so long, but I am looking forward to the challenge' (G2). Unlike the Apprentices, there were signs that momentum was needed on occasion. When asked why she thought she was still doing the same job as when she graduated, G3 replied:

> *It is a good question, and I have never really got down to the roots of it...I might very well go back and find that out. (G3)*

Others had to be persistent to achieve their goals. This is not without risk. When G6 decided to further his career, his employer might have let him go rather than sponsor him.

> *Previously my employer seemed to select people. I was dissatisfied with my career and planned to leave and do a full time MSc. in Systems Engineering at [X]. Eventually my employer agreed to sponsor me on IGDS. (G6)*

By taking this risk, G6 now knows that the company considers he has a future with them. This could be a good bargaining tool. Some Graduates found that after a few years of employment, there was a need for a challenge, which was not always fulfilled: 'thought I have got to look elsewhere to pursue my career' (G4). Sometimes this manifested itself as frustration, but again there needed to be a catalyst:

> *The managing director had said that his future was in this business and he wouldn't be leaving. Two months later he left. I was just at an all time low really... I then left the company....Then after that I came back [here]. (G7)*

For others, the catalyst was 'a challenge....They thought I would be successful' (G2). When he was questioned about whether he had risen to the challenge G2 observed that he 'had had another promotion' which demonstrated that he 'had been successful....Otherwise they wouldn't have given me the opportunity'. This confirms his developing confidence.

Lack of a challenge can lead to feeling thwarted, something not so palpable with the Apprentices.

> *After about four years, I was getting a little bit fed up, wasn't getting anywhere, wanted to do the MSc., lot of [colleagues] were doing the MSc. (G4)*

For G4 frustration led to a job change, part way through the MSc. This was the only instance among the Graduates when a change of employer occurred during the modular part of the course. This had a positive outcome, and an early indication of benefit from the course:

> *One of the reasons I got this job was the experience I picked up in those first seven modules that I did while I was at [Gen.Eng.Coy.]. (G4)*

Some graduates were in the right place at the right time, but without an outlook on life that encompassed mobility and risk-taking they might not have seized these opportunities: 'The only time I applied for a role was for six-sigma: the others were offered to me or functional managers asked me come on board' (G8).

One unusual example of career change was G5, who had moved from working for a local authority into industry, initially temping in logistics.

> *That role was made redundant through reorganisation...a production manager's job came up so I took that. I had no experience of working*

> *in production at all, so it took me three or four years to get my head round that...then I started to think - why? I then became aware of the MSc. through A21. (G5)*

As an NRG who had been working in the public sector, G5 must have already proved her ability to her company for them to give her a post in production.

None of the Graduates cited money as an issue, or the need to work in discussions about early life and educational background. Another distinction between the two groups is that the Graduates focussed more on what they could gain from the course itself. There could be two reasons for this. Firstly, having had a University education, Graduates are more aware of the 'bigger picture' and do not feel that they have missed an opportunity. Alternatively Graduates expect their employers to be responsible for the broader picture and offer a well-defined career path. To summarise, the Apprentices were more overtly outward looking, and less selfish than the Graduates, their moves motivated by the need for experience rather than their longer term career aspirations.

5.7 Sink or Swim

Attitudes towards mobility and risk-taking could emerge in different ways, given the diversity of the groups. For the Apprentices survival techniques could be developed in the jungle of street theatre. The Graduates might have acquired perseverance by osmosis during their years of student life. This section examines attitudinal issues relating to their early memories of the course.

5.7.1 The Apprentices

Several narratives illustrate the disparate educational and industrial backgrounds of the Apprentices, coupled with their approach to mobility and risk-taking. Many of the Apprentices (A4, A6, A7, A8, A9, A10, A11, and A22) had not been in a University environment prior to attending Midshire. Sometimes they found themselves in situations their training and background had not equipped them to manage, either unexpectedly or from choice. Of the unusual situations A1 described his plight most graphically:

> *I started off unaware that I was on the MSc. originally. I turned up here for a weeks' course...and it was only when I was [here] I realised it was a three year course I was part of. (A1)*

A1 carried on. His previous apprenticeships and training giving him the confidence to complete the course without questioning his own ability.

Reasons for joining the MSc. proved diverse. These ranged from the selfish 'initial motivation was purely and simply for the letters, and for the potential' (A10) through to 'it was all my instigation, badgering to get onto the course' (A4). Both these instances demonstrate determination. To join the course some Apprentices had to go through a rigorous selection process (A2, A6, A7, A8, A11, and A12): 'I forced myself onto a selection course, which I passed' (A6).

Companies need to demonstrate value for money from the delegates selected, therefore the selection process needed to be thorough.

> *Panel interviews and presentations were used to ascertain suitability.... Longest panel question and answer session (grilling) lasted approximately forty minutes, and involved some fairly serious pressure. At the debriefing, I was informed that the questioning had been pitched to crack most applicants by the twenty-minute mark – they eventually gave up with me! Having survived this, I was apparently judged to be suitably aware of the wider business, and made of strong enough stuff to survive the course. (A7)*

The wider business perspective is mentioned here, but this time from the employers' stance. For one Apprentice every employee in his company is 'tiered'. Depending on his category determined whether he would be allowed to begin a Masters course. Even so he 'had to put a proposal through, get it agreed' and still had to 'go through a selection panel' (A12). In spite of this he thought he 'was not special', suggesting a lack of confidence.

For some delegates, selection was not only about the business gaining value for money, but also about personal goals and future aspirations.

> *There was an application, interview, presentation, and second interview process where I was successful.... Why my employer selected me for Midshire was that: I had proved my desire to move on in the company.... My manager was willing to back me... [telling] Human Resources [HR] that the fact that I didn't have a primary degree should not be considered as a barrier. In his opinion I was more than capable. (A8)*

A8 perceived that he was being constrained by his lack of a degree: 'there was a glass ceiling that no one would ever admit to', denoting his view that apprentices are at a disadvantage when seeking career opportunities. 'Definitely need a degree to get above it, but an MSc. would be much better' (A8). Having been out of formal education for some time, A11 completed a PED. As soon as he finished that, he 'asked to join the Masters' being conscious that he did not want to 'stop the learning', because it was 'the next obvious step' (A11).

The quest for the 'bigger picture' was also seen as important. This is significant in the context of the training this group has had, where clearly defined criteria (Pring 1995:12) have to be met to complete their apprenticeship. This did not prevent them from being aware of the need for wider horizons. 'I wanted to learn more about the business...the bigger picture really' (A4). Sometimes the bigger picture was more visible to a manager.

> *The course came up, and my boss at the time said: "when you pass your Masters you will get all the Business and Management [you need] and then I will make you a director". (A3)*

When asked if the MSc. had made a difference, A2 was unequivocal that he 'would have stayed in ops.... They would have had me fire fighting for the rest of my life' (A2). His attitude had changed 'because of the MSc.'s tools and techniques' (A2). A9 had another standpoint in that he had 'no pressure...to achieve' but at the same time he 'didn't want to fail'. His underlying reason for taking the MSc. was because: 'I was here to broaden my experience, and not just get a qualification' (A9).

One delegate had a dual role, that of student and manager, with the power to influence. A10 joined the course to meet his career aspirations but soon identified that people following a common purpose could have a greater impact than one person in isolation.

> *Having a number of people within the organisation who had a shared knowledge level, or even a shared way of thinking could be beneficial, and within a couple of months of starting the MSc. programme [I] started encouraging other people to put their names forward. (A10)*

The number of users of a common language magnifies the effect of people speaking that language. One person cannot bring about change as easily as a multiplicity, another theme that emerged with the Graduates.

5.7.2 The Graduates

The Graduates have had the benefit of time at University without the anchoring effect of being in a working environment. This may have encouraged development of transferable skills (Lave 1988) on occasion among these Graduates.

> *The year up front made quite a big impact, because straight from school it was straight into industry, trying to understand what it was all about. You could see where these facts and figures about thermodynamics or strain gauges fitted in...it made a dry subject a lot more alive. (G1)*

> *I have gone from plant quality engineer to quality manager. I was concentrating on supplier quality, which is rather good background for quality and quality systems. Now I look after supply through production through to field as well. (G4)*

This example serves to confirm the MFG approach (Reynolds 1996) of development through the entire production process.

Sometimes the Graduates perceived unfamiliar situations as an opportunity rather than a threat: 'I have worked on three different projects, which were unrelated to my degree discipline, in some respects I saw it as a challenge' (G2). He continued 'during that time I have had another promotion...I am [now] looking forward to the challenge'.

The selection process to join the MSc. programme for the Graduates was varied and some had to compete (G1, G3, G6, G8, and G10): 'seven of us were interviewed for four places' (G3); others appeared to have been overlooked: 'my employer didn't select me; I asked if I could do it' (G5).

> *My employer seemed to select people. Headquarters said they needed to send a set number of people - they then looked for volunteers! (G6)*

Selection took different forms, from competition, through to a more strategic approach depicted as: 'the learning experiences that such a course might offer me' (G9); 'I was seen to have potential in the business' (G10), and 'recognition and investment by the company of my potential growth into a future role' (G6). These views demonstrate understanding implications for the future. Company selection criteria, including clear identification of skills and knowledge gaps that could be utilised by the company in the future, lend credence to this managerial approach.

The impetus for Graduates to attend the MSc. did not always come from the participants. Some were told to go: 'we didn't ask to go, we were sent' (G7). His company made a strategic decision to send three students citing that three together would have a greater impact: 'you have the power of three'. Management's previous experience had been that sending one person on an MSc. or MBA meant that on their return, singletons are like *'fish out of water, they don't fit'*. By this G7 meant that participants developed a level of understanding and language that resulted in three participants achieving a critical mass and they would 'actually be able to do things' (G7).

This is very similar to the 'shared knowledge' described by A10 who identified that 'pushing the others through' was beneficial. Other interviewees (A21, G5) also mentioned greater company benefit. Both groups demonstrated coping mechanisms. The Apprentices based theirs on the skills training of their apprenticeships and the Graduates applied their broader educational experiences. Both approaches benefit from multiple participants rather than individuals, and magnify the benefit gained from the course.

5.8 Module Choice

The second interview question prompted participants to relate memories of their educational expectations prior to beginning the course. I wanted to find out what their original thoughts were before returning to this issue later in the interview process. I hoped participants would respond about their individual experiences, rather than make specific comments about particular modules or presenters. To their credit, most comments were not specific. This suggests a level of maturity of the interviewees that reflects well on a Masters course of this calibre, and supports the educational benefits of the programme.

Participants on the MSc. have a wide module choice, within the framework outlined earlier. Issues that arise when selecting modules, include an affinity with particular

types of module, such as technical or operational ones, or an idealist view of selecting modules that might underpin limitations. A more pragmatic view of module selection could be practicality, familiar topics, or time constraints.

The DIP suggested 'they will choose the easy option won't they' but he hoped that taking the MSc. will lead to a 'broadening of the mind, learning in a constructive environment where they can learn to apply it as they go along' (DIP). This analysis seeks to clarify these views and critical issues begin to emerge.

With two exceptions (G5, A21), everyone had free choice over modules, within the constraints of the course. The exceptions worked for the same company, and each had 'one module' (G5) specified by management. Anecdotal evidence (ADGS) suggested that particular companies specified certain modules. This was not so. Companies allow individuals to select freely, which created several possibilities.

5.8.1 The Apprentices

Choice and Change

The Apprentices' module choice was evenly divided between choosing modules that had 'never been covered before' (A1), sometimes with the intention of 'extending / closing gaps in [their] knowledge base' (A7), and choosing modules that were business driven (A4, A6, A9, and A11):

> *My choices? Revolved around things that were in body and white paint, and I went for things like automation and robotics. (A4)*

> *What do I need to be able to run my own business, therefore what haven't I got in my toolkit? (A6)*

Also business driven, but with an eye on the future, A8 described his module choice as based on his 'plans for a career change' as well as needing 'to get buy off from my Manager and the Training Department' (A8). Thus while his module choice was not controlled, his employer was monitoring it.

Control was also mentioned by A5 who felt he had had 'a very structured, progressive education' as one might expect from an Apprentice. He chose 'more of the business options to try and broaden [his] perspective' suggesting a desire for wider horizons and an element of reflexivity. Taking a risk he took 'some less popular ones like Financial Decision Making because it was a departure from the technical ones' (A5). By so doing A5 not only extended his knowledge and skills, he took advantage of the full range of educational opportunities open to him. Reflecting on this, he continued 'I might have chosen one or two...that [were] fun to do' because he felt that his 'original module choice was objective oriented' implying a broadening of his outlook as the course progressed.

When asked if module choice had achieved the right balance most Apprentices felt that it had. Two Apprentices mentioned 'taking the easy option' (A1, A2) but did so from differing positions:

> *I tackled areas I hadn't tackled before.... It did make it a hard decision; I can see why a lot of people do tend to take the easy option. (A1)*

> *When I first started, I really just tried to do modules that I knew nothing about.... I was going to try and do things that were completely different, different, or unnatural to me. Now I have to get my modules in.... I have gone native. (A2)*

The perception that module choice, initially driven by knowledge gaps, became ease of completion for some is confirmed by A2: 'the choice then becomes: is it [within] a time frame or because you want to do the module?' and 'a lot was to do with timetable constraints' (A11).

In response to questioning about what they might have done differently, some Apprentices (A7, A8, and A10) had amended their original module choice while others (A3, A4, A5, and A11) wished they had changed. Reasons given rarely included poor quality or unsuitability:

> *At the time of choosing, my module selection was right. However, [my] career change in an unexpected direction....meant that some other modules may have been more relevant. (A7)*

One apprentice changed course from Q&R to EBM, because he found Q&R 'too narrow', and tended to choose modules as he 'went along' (A10). His view was that he 'initially made good choices' and merely 'changed his focus' to more business modules, having 'got something out of all of them'. The commonality of core modules made this an easy transition for A10.

The Good and the Bad

There was criticism of certain modules, but no one module was universally disliked; therefore I feel the information given by interviewees can be accepted as valid. This is mentioned here because it leads into debate surrounding critical issues during the course. One module described as a 'highlight' was Improving Personal Performance [IPP], for helping A4 to understand himself which he 'probably didn't before.... My wife, even to this day will tell me to go and make some more daisies' (A4).

Highlights for some were a downside for others: 'the module that I hated was IPP. It was very disappointing for me' (A3); and 'didn't want to waste a week doing the fluffy stuff [IPP]' (A11). Self-esteem was important here. A3 felt the need to qualify his view of this module.

> *I felt that I had been conned and I told them that. I said that you are conning people. I am just too clever to be conned...although I felt quite lonely at one point. I felt...I felt really out of it because I didn't get it. (A3)*

Although A3 was critical of this module his thoughts on the topic were more contemplative than A8: 'IPP was really good. Hard to explain why but I got a lot out of it'. A3 went on to discuss 'his' highlight and added some reflective comments to emphasise his views:

> *I did Innovation Strategy [INS], excellent module. Really excellent module, makes you think differently about how you handle problems, about...the management of change. (A3)*

Another thoughtful view introduced memory issues arising from modules. Memories at this point in the interviews (Halpern 1996:42) may be different from those that occur later in the questioning.

> *There are a number of good areas that come out [of] the modules. Very often I don't realise what the good areas are until something comes up at work that relates to [a] particular area. That can be sometime later. (A1)*

The two non-apprentices both raised the issue of choice versus timing: 'towards the end...it became almost I have got a free week coming up what can I fit in' (A21), but this was counterbalanced with: 'I found the spread of modules was excellent'. When asked what he might have done differently A22 replied:

> *I tended to stick to logistics or business ones, but now on reflection maybe some of the people modules might have helped me...that is an area I probably would change if I went back again. (A22)*

Different modules inspired different individuals, all part of the broadening experience delegates are exposed to during the course. 'Every one was of value' (A9) seems to summarise the general opinion of the Apprentices. Their experiences of early education may have differed from the Graduates, but now, part way through the MSc., similarities of language and attitude begin to emerge.

5.8.2 The Graduates

Choice and Change

The Graduates cited similar reasons for module choice, but introduced personal objectives: 'some of them were personal interests' (G1) and 'useful and comfortable went together' (G5), suggesting elements of self-interest that were not evident with the Apprentices. Another distinction from the Apprentices was that all but two Graduates (G5, G8) mentioned business needs as a reason for choosing modules. A recurring theme was 'ease of completion' (G10), a dimension rarely discussed by the Apprentices.

It is possible that early educational experience could account for this difference (Kelsall, Poole and Kuhn 1972:53)

Familiarity with a subject was sometimes a reason for selection: 'quality, logistics, things that I had a reasonable amount of experience with already' (G3), while for one the easy option was not the case. She 'avoided the quality modules' because she was 'in quality anyway' (G4). One non-relevant graduate 'avoided' the technical modules, 'I avoided them totally and I don't regret that, I regret not going more to the [business] end of the programme' (G5).

G8, an economics graduate, chose modules to meet his personal development plans. Another option was selecting 'different things.... I chose different modules to other people - Just completely different. I opted for more techie modules than the others' (G2). When asked if his decision was correct, he replied:

> *Even though there are modules which, with hindsight, I wouldn't have chosen perhaps, the combination gives you a good set of tools, and a grounding in many different areas, which apply back...in everyday life...at work and play perhaps. (G2)*

A 'set of tools' is suggested more than once, but not always in the same context. Tools are sometimes mentioned when participants are in reflective mode, often as a critical development. As the interviews progressed this theme of a toolkit gained prominence:

> *Exposure to and learning of new 'business tools and models' has been particularly useful in the context of approaching problems and managing projects. (G9)*

The tools delegates acquire whilst on the MSc. equip them with the skills to handle change well. In the current manufacturing environment ability to cope with change (Woods 1993) is paramount.

Changing modules was of lower priority for the Graduates, perhaps because of their broader education.

> *It wouldn't really have mattered which ones I chose, I have got so much out of each one. I have learned from every one, and I can't say that there has been anything that has been a bad choice really, or even anything which has been less relevant. (G3)*

Like the Apprentices, some found their 'choice changed quite a bit' because of a job change, or through identifying a new interest or need. G7 'recognised [he] had not got an understanding of something' but suggested that his original choice 'would have been an easy hit' (G7). This implies that 'easy options' may be one driver for module choice. G9 suggested that 'the overall problem' with the selection process 'lay with scheduling' but tempered this with 'the holistic view of business, [was] reinforced by the level of networking with other industries' (G9). Networking, mentioned here for the first time, gains prominence as the interviews progressed.

The Good and the Bad

The Graduates held an open-minded view of which modules were good or bad, and occasionally a specific topic was highlighted: 'one subject area which I haven't yet used is finance' (G8). In discussion they grouped modules together: 'I would have chosen more systems or IT orientated modules instead of logistics and materials' (G10), and; 'I think the people based ones have been the best really for me' (G4), rather than identifying individual modules, providing further evidence of the broad approach adopted by the Graduates.

The Graduates were more cognisant of modules that had an element of overlap: 'I did INS, New Product Development, and CD. I could have dropped one easily' (G7); but rarely from a negative perspective: 'I found IPP and LSP very, very similar' (G1). These sentiments expressed by the Graduates demonstrated wider horizons when it came to putting the MSc. into context.

> *The currency of the Midshire teaching material and our [MFG and his own] ability to put it into a business context meant that the learning experience was quite different [from previous courses]. (G8)*

> *What I find most interesting [is] when I am there I am relaxed, more relaxed than when I am here [work], and I think about things and how to apply things at work all the time, that's really useful. (G7)*

Being more relaxed at MFG than when at work was the effect the DIP was looking for when he mentioned expecting delegates to find being at MFG more beneficial than being at work. For the Graduates, the 'bad' really was not relevant, with their different educational experience they focussed more on learning outcomes.

One module was singled out as of poor quality (G2, G7), but each delegate qualified his comments knowing that MFG had acted swiftly to rectify the situation by removing the module from the schedules. Negative educational experiences at MFG are limited and had little impact on the critical perspectives that follow.

5.9 Reflections

Both Graduates and Apprentices demonstrated reflective thinking (Brookfield 1987:29) during this early stage of the interviews with the Graduates being more reflective than the Apprentices. This resulted in glimpses of what benefits the course might offer.

> *I think...I probably got more out of it than the company has, just because of the way the company has handled it. (G4)*

> *I can comfortably hold a conversation with the more senior individuals within our organisation, whose interests lie in more strategic arenas, rather than operational issues. (G10)*

> *I don't believe that the choice of modules is the major factor that determines success for the participant or not. I think the attitude of the*

> *individual and the company are major drivers: the key is promoting a "learning" attitude not "learning" the right technical details to get a promotion. (G8)*

This demonstrates that reflective learning may occur throughout the programme with areas not immediately relevant being digested and stored for future application (Eraut 1999).

Critical elements emerging from the discourse include 'exposure to and learning of new 'business tools/models' (G9), putting these skills in the 'context of approaching problems and managing projects' enabling 'a more circumspect viewpoint' of issues of which they were not cognisant prior to the course.

The Apprentices also offered some reflective views:

> *I believe that my change of environment, and the accompanying loss of familiarity/security has been eased considerably by my ability to draw upon much of the knowledge and awareness imparted by the course, in the context of both understanding the functionality of the wider business, and being able to convey the logic and reason of high level outcomes and decisions to subordinates. Most noticeably, the self-confidence, which comes from this level of knowledge, really does seem to make a difference in dealing with what may otherwise have been difficult situations. (A7)*

> *When I started...I didn't know who to ask, and I was getting frustrated about not having that knowledge, I didn't know, but now I know who to ask, and what is available. What to ask is probably the more important. (A4)*

These comments reflect growing confidence from the Apprentices. This level of change was not so apparent in the Graduate group. Again networking is gaining prominence.

5.10 Summary

This chapter has provided a glimpse into the background of the study group, giving details of the educational and industrial experiences of the participants prior to starting the MSc. It has considered the disparate groups of students and indicated where the groups might begin to converge in terms of language and thinking.

Industrial experience of the Apprentices was primed by structured training whereas the Graduates encountered the freedom of University life. The impact of these differences was apparent in their initial approach to the MSc. The Apprentices' availing themselves of the opportunities open to them with a sense of excitement, whilst the Graduates were looking for broader perspectives from the programme.

Mobility and risk-taking was also influenced by participants' early background. Graduates were less mobile than Apprentices, but both groups being willing to take

risks based on past experience. All the interviewees had an attitude to life that encouraged survival and themes of networking and the acquisition of management tools begin to emerge. Module choice was generally unrestricted and a wide range of selection became apparent. This chapter provides the setting for the discussions that follow.

Whilst there are some attitudinal differences between the two groups there is no discernible boundary. The pattern is more a scatter graph with Apprentices and Graduates ranged along the line in overlapping sequence. The different ways of thinking evident between the Apprentices and Graduates will be developed in the next chapter.

CHAPTER SIX

6 Critical Perspectives

Much has been written about critical 'happenings', using different nouns paired with the adjective (Thomson et al.'s Moments, Tripp's Incidents, Woods' Events, Sikes, Measor and Woods' Phases, Ghaye & Ghaye's Reflections). All of them use the word critical in the phrase, yet each has a different connotation. One interpretation of this miscellany is an implication of measurement. Identifying the extent of such 'happenings' is not easy using quantitative measurement. For this chapter the phrase 'critical occasion' has been adopted, which allows for the diversity of critical happenings chronicled by the interviewees.

This chapter considers questions 3 and 4 of the interview schedule and is divided into two sections. The first examines the impact critical occasions have had on delegates' attitudes and the wider horizons so important to their everyday lives. It reviews examples described by delegates from their perception and relates them to a range of alternative critical happenings. The second section considers the impact the MSc. has had on how individual students' lives have been changed by these critical occasions.

This thesis uses qualitative judgement to determine if the critical happenings of the study group can be categorised into the range of critical occasions identified in previous research. There is the dilemma that judgement of individual 'happenings' by interviewees may differ one from another and from the literature equivalent. The study will demonstrate that it is possible to determine that there can be a basis for nomenclature using the critical incidents described by the participants.

I had no expectations of how many critical occasions would be forthcoming from participants. At one end of the spectrum Flanagan (1954) suggests that critical incidents occur only rarely, implying that not all delegates would be able to relate a critical incident. At the other end of the continuum lie critical phases (Sikes, Measor & Woods 1985) that cover a much longer time span without the step-change of a critical incident. All the participants were able to describe at least one critical occasion. None of these was a negative example that might lead to 'personal or educationally retrogressive consequences' (Woods 1993:2).

It is possible that I may have inadvertently implied to respondents that negative examples were not acceptable. This was not my intention. Another scenario is that because the research group was nearing the end of the taught element of the module anyone who had had a negative experience might not have continued with the course. A further alternative was delegates feeling unable to share any negative experiences they had undergone. The lack of negative examples is consistent with Flanagan and Tripp's earlier research.

The section follows the order of magnitude of critical occasions from Thomson's fleeting critical moments through to critical phases described by Sikes, Measor and Woods. This allows opportunity to demonstrate that there may be overlap between the

differing categories of critical occasion. For this chapter the two subsets of Apprentices and Graduates have been combined and some critical occasions described by the focus group [F1-5] have been included to add weight to the debate.

Critical occasions range from sudden flashes of clarity (Tripp), through to reflective memories (Ghaye and Ghaye, Rosen), just as had been expected from earlier readings. A developing theme that of networking with other delegates, became evident as a key part of the learning process. Everyone had at least one example of a critical occasion to recount and some of these were pivotal to their developing confidence.

6.1 Critical Occasions

6.1.1 Critical Moments

According to Thomson et al. a critical moment has 'important consequences for their lives and identities' (2002:339). Identification of such critical moments has to rely on participants' judgement since only they are fully aware of the impact these occasions have on their lives.

One delegate used 'moment' to describe a critical occasion, but she used it in the context of being within a bigger occasion – that of a module. This suggests that nesting inside a critical event there may sometimes be a critical moment.

> *Two things I think for me. One was going on INS. It really challenged the way I thought about things, the way that we try and get results at work. We are quite structured about [that].... There are a lot of other ways you can do it. So that was quite a critical moment. (G3)*

The second occasion for G3 was being motivated by the module 'to go out and buy two books', which she uses frequently. One book was about chaos theory and 'one was a book about systems thinking' (G3). The module primarily gave her the impetus to acquire knowledge about a specific theory; and awakened a need for knowledge about the way people think. The critical moment or decision was to buy the books, and no human interaction took place, but reflection may have helped to reach the decision to purchase.

An example focussing on one particular occasion came from G2 who described 'one of the bits that tipped the balance' that happened during one of the sessions in MC: 'it was really relevant...the timing was right...got the creative juices flowing' (G2). He elaborated by outlining his plans for starting his own business. This was certainly a brief moment in time, not a flashbulb, more an illumination of one way forward with spreading implications, therefore a critical moment.

A 'practical' critical moment occurred to F2. An American, he suddenly found his UK contract had been extended for another two years and so if he were 'to get any higher had to get another piece of paper, and staying in the UK' gave him an opportunity so to

do. Here is a down to earth realistic approach to the education being offered, but the decision to join the MSc. was spontaneous.

A7's description of a critical moment fits this category well. He chose the word 'revelation' to describe his discovery that 'tutors expected some degree of questioning' (A7). This has connotations of brevity and implies an instance that had an important influence on his attitude toward the course (Sikes et al. 1985). He expanded this to include the effect of interacting with others using a variety of 'alternative views / disagreements / conflicting experiences etc.' (A7). Exposure to these different opinions gave him the chance to '"straighten out" concepts or arguments that might otherwise have gone to waste' (A7). This became the critical moment, when A7 engaged with the course and crystallised the learning by being involved with other people. An analogy might be the effect of a pebble being thrown into water. This is a defining moment, with the consequences rippling outwards thereafter.

6.1.2 Critical Incidents

Tripp (1993:24) described critical incidents as being a 'significant turning-point'; Woods expanded on this adding 'they are unplanned, unanticipated and uncontrolled...flashpoints that illuminate...some key...aspect' (1993:1). The example given above as a critical moment might have been pivotal, but it was not highly charged. One parameter I applied to determine if something was a 'flashpoint' was that it should 'in the same instant provide a solution' (ibid.). To the individual, the occasion described may have been a flashbulb, but for it to make sense to others it may be necessary to put the occasion into context. One such example is A2:

> *I can always remember [he] said that the people who have got business experience would probably do better than those who had just had education. That helped. (A2)*

For A2 this flashbulb happened at the beginning of the MSc. He was sitting in a room full of younger engineers, who were mostly better qualified than him. He was wondering whether he would be able to cope with the work. He could 'always remember thinking have I done the right thing here' (A2). He was concerned that his peers might have big expectations of him, since he was older than they were: 'I sat there thinking; I am in the wrong place' (A2). I asked A2 when he realised that he was in the right place. His response was unhesitating: 'by the end of the first day I was convinced I was in the right place' (A2). He added embellishment to his story:

> *It's just when you are sat there, with these people with – "I have got this in engineering and this and this", and I was thinking hang on, all I've got is CIPS and an HND, and I was thinking have I really - gone too far? And people were saying: " no you've done the right thing". (A2)*

This critical occasion consolidates some topics from the previous chapter. The language that this Apprentice used implies a lack of confidence, even though he has a

professional qualification. A2's attitude is positive and one of eagerness, with a suggestion that he was searching for a reason to continue with the course. When he was able to relate his situation to having 'business experience' he felt comfortable with his position, and was prepared to stay.

For A2 the flashbulb may not appear to have the important consequences of a critical moment but the situation was highly charged when it happened, and was resolved quite quickly. The analogy here could be of a light bulb. To A2, what was pivotal was his decision to remain on the course. The far-reaching implications of having left the course on his career, both internally with his employers and externally in the job market would have been restricting. Accordingly I have classified this occasion as an incident with far wider implications than a critical moment.

Memories were not always immediately forthcoming. G7 first described an incident that was not related to the MSc. at all, but on further questioning he recalled another critical incident relating to work and the reason why he was now taking the MSc. The two occasions were not related, and without my probing the second example might not have been forthcoming.

> *The big changing point for me...was when I went to a management-training course when I was a development engineer. There was a management course for the principal engineers...one of the draughtsmen said he didn't want to go. I went on the course as filler...and as it turned out, I became a leader of the whole group on the course. From that point on, they thought they had better find me a [management] position.... So that was a critical incident in my career, and it's been sort of steadily upward ever since. (G7)*

This was an occasion where the impact was far-reaching with very positive results. It emerged from G7's memory when prompted (Rosen 1998). It was clear in the subsequent conversation that G7 viewed the incident as relevant because had it not happened he would not have joined the MSc.

Sometimes the flashbulb occurred during the taught part of the course, but off-campus. One example relating to a career decision happened at work during a round of redundancies. A3 described the incident that gave rise to his planned career move:

> *I suppose the thing that sticks out is it was probably pretty quick, it wasn't gradual, and it wasn't as though I had been thinking about it. There was an incident where one of my old quality team came in to me, about two weeks after most of the people had gone at director level.... He showed me this photo of all the old directors, and he said, "This was five or six years ago, and there's not one of them left now; not one". That was it and he said to me, "So - watch out". That was probably the thing that I thought; bloody right you know, that was the one that took it off the back burner. (A3)*

This occasion was certainly in a highly charged atmosphere, and although it may be seen as not directly relevant to the MSc., subsequent discussion indicated that without the benefit of exposure to unfamiliar topics A3 would not have been able to contemplate a career change.

One critical incident that was also off-campus was offered by F1, who described himself as 'not poor, I can afford my Birmingham City season ticket; I have no need to do this course... I am a Brummy and I am not clever' (F1). He was the first of the focus group to proffer a critical occasion, and as such the first person to speak about his occasion in public. His 'most important' example was the realisation that 'the thing that would make [his] Dad most proud would be seeing [him] get his MSc.' (F1). He had previously admitted to not getting 'on particularly well' with his father. To admit to this in a public place is sound testimony to the confidence gained by completing the modular stage of the programme.

A9 also outlined an 'off-campus' situation when he saw a health and safety problem which he 'stopped happening' immediately. This made him 'not a popular guy at all'. He attributed his ability to act in a dangerous situation to 'having learned all those [MFG] tools and having the confidence to use them'. Although A9 considered this occasion a flashbulb he agreed that there had been an element of reflexivity for him to be able to act so promptly.

Being exposed to new tools can only be one part of the experience – having the confidence to use them is necessary for the educational benefit to be gained. A9 imputed his example to be a positive occasion, but in different circumstances a negative outcome might have occurred, with disastrous consequences. Prevention of a negative outcome suggests he had gained sufficient confidence from the course.

A brief point in time that did have a big influence for G4 happened in IPP. There are no outward ripples from this example so I consider it to be a flashbulb, with the effects on her as an individual being considerable.

> *The thing I picked up from IPP was...that I am quite small, and quite quiet.... How tall are you?... Just think of the number 64. As you think of 64 you draw yourself up and walk in straight, head up high, make yourself look bigger, a complete presence; and I think that has stuck. That is probably one thing that has really stuck 'cos I keep thinking of that, because I think that if I hadn't done IPP I don't think I would have been in this job. (G4)*

The flashbulb solution in this example is not inspirational in the conventional sense, but G4 identified a wider appreciation of that which she is capable. Increased confidence may have been brought on by her reflection. The result of this flashbulb for G4 was a company move, the ultimate change. Building up a person's confidence is one key outcome of the MSc., but it is not formally recognised as such. There is a gradual awakening of confidence from being in situations where individuals are required to interact under circumstances where they might not normally do so.

Taguchi's design of experiments figured in A5's critical incident, but again with an element of reflection. He described a syndicate activity that occurred during a Quality module where the individual dynamics of paper aeroplanes were varied. 'While we were doing that everything clicked into place' (A5). He had an unresolved design problem at work. A5 went back to work, collected his team and repeated the Taguchi process. 'Within a couple of hours' he had 'pinned down the problem' that for him had been an ongoing source of frustration. A5's critical occasion draws on several aspects of the course: the tools offered by MFG; use of a syndicate exercise; and confidence to apply the learning directly to a workplace situation.

Each of these occasions fits well with the criteria suggested by Sikes, Measor and Woods (1985:230) for them to be classified as critical incidents in the lives of these students. Each example had brief human interaction, but the distinction between critical moments and incidents is mine. There may well be an element of overlap between these two categories on occasion.

6.1.3 Critical Events

Another critical occasion found in the research literature is that of critical events, described by Woods (1993) as something children remember for a long time to come. One-week modules encapsulate the notion of an 'event' but occur more frequently than do musicals in a school. Could recurrence reduce the impact on delegates when compared to an annual event? This was not so. Several students cited one module as their critical occasion, and some modules were mentioned several times.

For the Graduates, a module was sometimes classified as a critical event without further need for clarification from me. For G8 his critical event was IPP. His experience was immediate, but timing of his attending the module may have influenced the outcome.

> *Just before IPP I [was] offered secondment to Toronto, and initially turned it down. I took the opportunity...to consider the personal, career and development implications of my decision. It was through...consulting with my fellow "students", tutors and a lot of hard thinking by myself that I decided to take up the secondment. Much of my turnaround decision was based on confidence: I needed a push, some encouragement to actually take the decision to go. This was a huge decision for me: without that event, I would not have gone and would not have gained the experience, credibility and opportunity, which I did. (G8)*

This event was life changing for G8. He identified that this was based on growing confidence and networking. This leads into consideration of the outcome of critical occasions. As an individual gains in confidence so they are more able to embrace change (Fullan 2001). This leads into a form of virtuous circle (Kolb; Dennison and Kirk).

> *The thing I believe changed me for the better in the whole process was my attendance on IPP. From this point on I changed my way of looking at things and realised that if I didn't take responsibility for my own actions then I would fail in my attempts in furthering my career....Until I had some mechanism for dealing with this, then accepting the fact that I was responsible was difficult. Attending IPP...was not a comfortable place to be and by removing me from my comfort zone it allowed me to look at how I processed information and the outcomes I expected versus the input I provided. (A8)*

This is far from being a pivotal point in terms of time, but A8's continuing discussion of the module impact made it evident it was a turning point in his life. Since he was referring to one module I categorised it as a critical event. Another theme that of a tool box, emerged from A8's further thoughts. The effect IPP had on his outlook resulted in plans to take a psychology degree when he graduates from Midshire because:

> *Neuro Linguistic Programming became a hobby from the second I was exposed to it and it remains as a main tool in my box for dealing with people on many levels.... I believe this was definitely my critical incident as it marked a turning point in my life. It was interesting that my family and work colleagues spotted the change in my attitude and understanding of what I wanted, where I wanted to go and most importantly my tools to get there. (A8)*

Again attitude occurs as an integral part of this critical occasion but also the possibility that nesting within A8's critical event was a critical moment. A8's description of being out of his comfort zone suggests that there was a specific point during the module that was more tense than the rest. This implies that a critical incident may occur within the critical event of a module.

IPP was important for A6. The module helped him through a critical period in his life: 'I tended to live my life with a degree of fear, always taking the safe options'. IPP gave A6 'confidence, both at work and home' enabling him to 'take more risks which often pay off'. Once again confidence is a recurring topic. Later A6 disclosed that he wished he felt able to be less 'risk averse'. Awareness of his limitations and an ability to share them with me demonstrates a degree of maturity that might not have been present without taking the course.

For A21, her critical occasion was also IPP. It acted as the catalyst. It was 'the module. It brought everything together' (A21). She felt she 'really can change things, [by] influencing people' (A21). For her it was a pivotal point because 'since then tools and techniques from different modules have come to the fore, but without IPP...the effect would not have been so dramatic'. A21 mentioned that there was also an 'ongoing effect' to attending IPP, which although reduced was still strong enough for her boss to remark upon it. She had attended this module part-way through her first year, at just the point where the DIP expected acceleration in learning to occur.

A22 also identified a module as his critical event, but he was unique in his description of the module 'getting him so frustrated, [he] could clearly see where his company was going wrong'. There could be an element of negativity here when frustration was demonstrated, but A22 turned it to his advantage when he thought all his business' problems stemmed from 'not having a strategy' and his 'eyes went bang' (A22). This is unmistakably a workplace example in the mould MFG would expect.

When asked if he had been able to change things A22 replied emphatically: 'yes we convinced the managing director to do a strategy workshop'. The key issue was 'how much comes out of that strategy, everyone's day to day job depends on that' (A22). Frustration here led to progress rather than an eye opening occasion (Morrison 1998). The ongoing benefit from the module suggests an element of overlap with a critical phase. A22's description of an entire module as being his critical occasion is slightly different from his portrayal of the eye opening effect it created. Here is a critical moment within a whole event that has not been anchored in a specific instant or identified as reflective.

One example I classified as a critical event, which relies on participant definition since it might be considered a critical phase, is A10's critical occasion. He identified a critical phase before homing in on a key module as his critical event. He took IPP 'without really knowing what to expect' and found that he had a 'strange week' culminating in his putting the manual in the boot of his car and 'heading for home' not intending to complete the PMA, feeling he had 'wasted a week' (A10). But reflection on holiday led to him completing the PMA. This in turn 'gave him an understanding of what he had learned during the module'. This is an appreciation that has 'continued to develop' and an awareness of 'himself' (A10) thereafter.

Here a period of reflection changed A10's perception both of the module itself, and on what the learning outcomes were. It is apparent that the learning did not happen in situ, but required a period of reflection and contemplation for the maximum impact to be appreciated. It also suggests an increase in benefit over time (Boud, et al. 1985).

Different parts of separate modules affect students in various ways:

> *There isn't just one I can think of.... In a number of job moves I have found different parts of the course have been very useful. In the initial move from a production supervisor to financial analyst...courses that I had done...came just at the right time. That worked very very well, because I was...able to go very much head to head with a few of the management accountants and stand my ground. (G1)*

G7 viewed critical events as being the impact on his fellow company participants from the perspective of the overall impact on the business. The effect of there being a critical mass of people in one firm followed through to bigger occasions.

> *The one that has had the most impact for us was INS. The fact that other people used these tools, and we had only heard about*

> *them...mind mapping and things. We became exponents of the art of mind mapping, and I would suggest that that module in itself changed the way we think about our product development process.... That was a big turning point. It boosted people's morale and got the word innovation as part of our culture. So I guess that was our biggest single change. (G7)*

Interestingly G7 chose to use the phrase 'turning point' (Tripp). Discussion followed about how IPP had affected G7 as an individual. It emerged that he 'was a different person, totally different person' when he returned to work the following week. The effect did decrease over time: 'now I have settled down, calmer more normal now' (G7). The way G7 described this critical event showed no reflective stance by him. It happened in real time.

Linking a critical event with attitude and ability to change A12 approached IPP with: 'I came with an attitude about the type of person I am, and when I left [the module] I had a very different attitude and understanding of perception' A12. He changed much of what he does, his focus and his order of priority. The outcome was he changed jobs and the way he operates on a day to day basis. He felt he:

> *could not put it down to any one thing, but [he] then became fascinated...about why some people get more 'flashbulbs' than others and why do they come at times when you are not expecting them. One [upshot] was understanding how the brain works.... It opened up something in me...would it help me to have more inspirational flashbulbs, would it help me do my job better? (A12)*

This resulted in further study about 'how the brain worked' (A12) to try and encourage his brain to have more of these instances (Doty). This understanding has enabled A12 to 'foster the conditions a lot more' hoping to have more 'flashpoints'. The knowledge that he needed to allow himself time for his 'subconscious to work on the problems' has been vital. In his view what the module did was let him 'open up a whole new route of new potential' (A12) and now he consciously makes time for reflection.

This understanding enabled him to let his 'brain float because the brain works at different levels' (A12). It gave him the confidence deliberately to leave problems (Doty 1998), knowing that his brain will carry on working on the problem (Halpern 1996). You need to 'schedule downtime' (A12) for this to work. To do this he needed an awareness of when he was 'reaching the point of frustration [to] go and do something else' (A12). He has avoided some frustration by adopting this strategy in completion of his PMAs.

The critical event for A11 involved two overlapping, but different modules. One was undertaken as part of his MSc., and the other as part of work-based learning. A11 perceived the key issues to be: timing of the second module and to them both being highly relevant to his work at the time, lending further credence to the practical work-

based approach of MFG. He identified the 'overlap' between the two modules as important because without it 'there wouldn't have been the quick hit of learning' (A11). Here is evidence that two modules together had a greater impact than singletons. Attitude emerges as a theme again here with A11 reflecting that if he 'hadn't come up from the shop-floor' and understood operations inside out, his critical event might have been different.

I have described this example as an 'event' but it might have been classified as a 'phase'. Another perspective is that the participants' definition of phase and event might not match that of the literature (Sikes, et al. 1985, Woods 1993) and that I may have the wrong classification. Further study would be needed to clarify this.

6.1.4 Critical Phases

Sikes, et al.'s (1985) study of critical phases suggests periods of strain. For many of these students this period could relate to the duration of the course, having to complete an MSc. as well as maintain a fulltime job. A10 mentioned his ability 'to talk to specialists from a position of knowledge rather than from a position of no knowledge' as being 'ongoing throughout the programme, knowledge is there all the time'. The timescale here is long enough to be a critical phase.

Critical phases could include groups of modules. G5 related three modules together as her critical phase. The modules themselves, IPP, QMT and LSP were not linked in any clear way. She reasoned they were critical because they 'fitted in well with what was going on' at work. She felt it was a 'question of luck as to what is happening in the organisation when you get back to work' (G5). When pressed on what was critical G5 said what she had learned was:

> *that you have customers, and you must have the confidence to ask them if their requirements are being met, as well as being a leader. It was realising that people are real. They exist, they are not a commodity. (G5)*

This particular occasion had involved an altercation with another that resulted in her being asked to leave the class. As a result of this she 'went completely the other way' and became 'a doormat' until she 'regained [her] confidence...and mellowed out' and reverted to 'asking her customers what it was they wanted from her' (G5). Again increasing confidence appears in discussion but it is supported by practical application as being a major benefit. She continued:

> *I have unconsciously gone for self-preservation; I can't allow other people to survive at my expense. It is not about empire building, nobody else has more rights than I do. (G5)*

There was a view that the 'formative times [in the course]...were the first three or four and the last three or four modules' (G9). This opinion was confirmed by A3, A6, A7, A9, G5, G8, G10 and F3. Here the phases within the programme align well with periods of tension in the course, the beginning and near its taught conclusion. By the last few:

'you are making the most of the last few weeks away, both socially and intellectually' (G9).

> *The whole MSc. has been a critical event for me...but the middle section I had difficulty motivating myself. (F3)*

People related issues were cited as 'the biggest thing' by G4, but the tools that enabled her to handle these issues were acquired during modules. G4 was involved in making people redundant when I interviewed her. She believed that the 'curve with anger, denial, all those sorts of issues' (Kubler-Ross 1970) had been 'particularly useful' in enabling her to 'judge how people are going to react' (G4). The confidence gained on IPP (height) had enabled her to handle a potentially difficult situation, but her knowledge was acquired during a module.

Support from his employer was cited by F4 as the reason he 'stuck with the course'. F4 was a graduate who had 'never failed an exam in his life' but he had been sent on the course for the business experience he would gain, not the qualification. Work pressures led to him 'towards a suspension' until his manager found out. The outcome of that being that he was 'demoted', asked 'what [he] needed to do to ensure [he] completed' and told to 'stay there' until he had done his project. F4 attributed his renewed motivation to his manager but added that without the support of his academic tutor he still might not have completed. This confirms the benefit of involving participating companies in the programme.

G4 developed the theme of people by saying there had 'been some good discussions, particularly relating to six sigma' (G4) again highlighting networking as an additional dimension of the MSc. Networking provided 'a few contacts and a few tips' further clarifying the practical implementation of the learning. People were also important to G7. In recounting his experiences G7 felt that:

> *The thing [I] learnt most was how people relate to each other. How people [are] norming, forming, storming, and observing what's going on with other people. I spend quite a lot of time watching other people argue, thinking "why doesn't he just say that. He is not listening, and he is not taking in what's being said". So I did learn a lot about people. (G7)*

Emphasising that not all modules have the same influence with everyone, unlike other delegates G7 described 'not coming back a changed man' from IPP. This was also true for G8: 'In my case, the "personal improvement" wasn't really the issue', but he qualified this by drawing on the people aspects: 'It was the collective support of my group that convinced me that I "could do it"' (G8). In a similar vein G4 returned to the discussion about redundancies:

> *It is also good to hear what other companies are doing too, how they are handling change, how they are handling redundancies and whatever. (G4)*

G4 works for a general engineering company that is market focussed. Drawing on module content for practical issues was important for her. Being aware of 'where our products are in the marketplace, your stars, dogs that kind of thing' (G4) was 'good to understand' and she found that along with finance it helped the jigsaw fit into place. In describing her critical occasion, G4 drew on different aspects of several modules including: content, syndicate work and fellow participants to emphasise her story. This to me makes it a critical phase but not necessarily to the exclusion of other critical occasions within the same time frame.

For others, the wider view of two or three modules being taken together produced a promising way forward and confirms critical phases as being important to their education. G1 had had a recent job change. He identified he should have done 'more of the MC, and INS type module much earlier on' which would have given him more exposure to 'the general kind of business theories...which were all about change management' (G1). His view was focussed on his business needs at that time, with a need for 'the right kind of stuff, sort of defusing in' (G1). Greater confidence leads to an ability to handle change (Hamel 2000) and employs reflection (Bass and Vaughan 1966).

> *I suppose there's been definite things like business and economics, where it has just brought awareness in. But what's interesting now...I look back and start to pull a lot of bits and pieces together.... I am thinking through a whole host of issues that I would have had very little awareness or never even contemplated prior to the course. (G1)*

A more expansive view of a critical phase was provided by A1. He introduced the word 'phase' without prompting:

> *I think I am still in the phase of thinking wow; this is a lot of work how am I going to get through it. My workload is increasing all the time and the time factor [gets worse], with so much going on at work. (A1)*

One delegate linked critical moments with a critical phase, completing the circle. For F5 the critical moment happened prior to arriving at MFG. Based in Northern Ireland his preferred course was not on the Mainland. He was told it was company policy to attend Midshire and so his destiny was pre-determined. F5 went on to add that he felt as a result of this decision he considered the whole course to be critical.

This use of the word phase here emphasises my earlier thoughts that the whole course could be considered a critical phase for some participants. This would need further study for confirmation to be possible using more criteria. Using time-span as a yardstick, critical phases are the largest critical occasion. I wondered if any other perspectives might influence participants.

6.1.5 Critical Methods

Another dimension of a modular MSc. might be finding that one mode of delivery used in several modules was a key factor for some students. A common teaching method

adopted is syndicate work (Knapper and Cropley 2000) and this proved to be a critical technique for some. A2 contended that the effectiveness of syndicate exercises depended 'on who you get in the group, how responsive they want to be' suggesting that fellow participants can be a limiting factor.

Most of the critical occasions described above have involved others. A2 linked education and people together in one phrase: 'I don't think content's always the issue, sometimes it is the participants.... I came out as a shaper' (A2). A2 reflected on how he felt 'the syndicate exercises...help embed the learning' (A2), but that he 'needed the wider picture' to explain why this was so. This suggests syndicates alone would not provide the educational experience needed to achieve the desired outcome from the course.

When asked if his approach to syndicate exercises had changed, A2 suggested that syndicate work had altered his actions. 'You actually start moving politically, how you are going to manoeuvre people' (A2). There was evidence too that my prompting encouraged reflection:

> *It has been a combination 'cos I have found that I have done things on [this module and that module] and then I have done presentations back at work and people have said, "God that's good, where did you get that from?" I mean the penny may not have dropped physically, but what I have done afterwards had an effect that way. (A2)*

Here there is a suggestion of reflective awareness (Boyd and Fales 1983) embedding the learning once A2 had to explain his thoughts to others. Having thought about people and techniques A2 was able to identify that for him two factors were necessary for the benefit to be greater than the sum of the parts: content and colleagues. A similar pattern to the 'fish out of water' theme from the previous chapter emerges. Key factors such as networking and syndicate exercises being drawn out from delegate experiences are analogous to the lines on a parachute. So 'sink or swim' may become a series of different lifelines that are played out like a parachute leading to a successful soft landing, with diverse lines being appropriate for different delegates.

6.1.6 Critical Reflections

Critical reflections (Ghaye and Ghaye 1998) involve retrospective awareness of past happenings. These may comprise memories of different kinds, including episodic, unconscious or reconstructive (Rosen 1998). Reflection happens to the individual, and whilst others may be involved, in triggering the memory, the resulting reflections are personal.

There were many reflective thoughts, mainly drawing on experience over several modules. Sometimes the memory was hazy and unspecific:

> *What you find is that out of every module you are never going to remember everything that you have covered, so you remember*

> *particular instances or examples out of certain modules. It tends to be prompted...I remember something from this module, or that topic. So it is not necessarily anything like a flash of insight at the time. It is something that maybe afterwards you are sitting reflecting, and [you realise] that it is the same aspect from different modules. You get something out of each module; there is an element of overlap so it doesn't necessarily matter which module, as it were. (G3)*

When questioned about how much or what memories she had from different modules, G3 held that information from any one module 'varied very much [with] the module'. She found that 'some modules are about the way we go about thinking, or the way you go about doing things' but that also 'there are other modules that are much more practical' (G3). The diversity of modules available may affect the amount of knowledge remembered. People learn in different ways (Corning and Ratner 1967), some will respond more to theoretical aspects, others to the more practical. The MSc. provides this breadth and depth.

Frequently critical reflections drew on dimensions that were outside the seminar room and involved other people; suggesting human interaction (Rudduck 1978) might be needed as a trigger.

> *Can't think of one critical time...you know, just a general gathering of me becoming more involved with HR issues. I had to start thinking about the next thing.... And I am sure the MSc. had an effect... I am a different person now. (A3)*

This example from A3 followed on from his outlining the incident with the photograph. The reflections that occasion triggered resulted in his need to plan for his future. In my view this example incorporates two distinct features; that of the flashbulb (photograph), which triggered the need for him to reflect on his future. This provides evidence that there may be more ways of classification, and that by breaking the occasion down more than one aspect emerges. Another clear example of reflection came from A1:

> *In retrospect, one of the most important things I feel I have got from the course, is mixing with people, and understanding their businesses and how they do things. I do believe there is a lot of learning from other people, other candidates on the course. (A1)*

His thinking encompasses some wider benefits from the programme; that of people and work based examples from other businesses. This suggests that reflection can occur at any stage of the course and that it need not relate directly to the educational process that students undergo, but can incorporate other dimensions happening concurrently.

Evidence that my initial interview request had in itself triggered some reflection underpinning the learning outcome of 'creating capability' (Reynolds 1996) came from G2:

> *Thinking about this...I don't identify one critical incident. I think you are developing a tool box, and the way I look at it is it's all very sub-conscious the learning you achieve at [Midshire]...I don't believe you learn a great deal during the week. But, it is all sub-conscious, and you will be doing your day job and you will think – that is from MC or I did this in FACS, I understand that [now], and so on. So it doesn't click instantly after one module or anything like that. You can't say yes at one point, everything clicked and fell into place. (G2)*

As with critical incidents, participants drew on the influence of others when describing their occasion. For A3 the people dimension encompassed a change of career direction, and for A1 several individuals prompted his memory. A1 introduced networking into the equation with further evidence of the influence of people (Siegel and Siegel 1957) being offered by A7 who expanded on his critical moment, by adding:

> *Continuing discussions / disagreements carried over into free time amongst fellow students provided a forum for reinforcing learning. Once the first few modules had passed, what would have once represented a major feat of concentration seemed to happen more easily, and I guess that this was probably symptomatic of "learning to learn" - correct approach, attitude, environment etc. - and this increased receptiveness seems to have become a permanent feature. (A7)*

Here is a situation where a reflection was linked by someone to a critical moment rather than the critical incident of A3. Once people are introduced into the debate, this can impinge on attitudes. A4 introduced body language in his example. He described a technique, learned during a module, which he had used with his manager over an issue relating directly to his MSc.

> *I had a difficult manager at work, who was aggressive. All I did was mirror his actions and soon he was talking to me like we were old buddies. It was a deliberate action on my behalf, and it worked. (A4)*

A4 reflected on how he could address a specific issue that was limiting his effectiveness. He pre-planned his actions before the occasion to defuse antagonism. His justification for it being critical was 'how the person receives information; body language is one of those things, and also how you say things' (A4). This situation describes a decision: that of copying someone's actions and provides evidence of a judicious way of using tools acquired during the MSc. to obvious advantage and encourages application of the learning.

The wider implication here is that the pivotal point alone would not have had any effect on a difficult scenario without some action having taken place. Intriguingly 'it went on like this for probably only five minutes then all of a sudden [it was] all forgotten' (A4), suggesting this small action had a high impact. This critical occasion was expanded to include actions as well as thoughts that in turn had an impact on attitude.

Creating competence through modular experience together with building confidence through syndicate work was a topic cited by G10. He described an occasion when he was sitting next to a managing director and he found he was able 'to talk with some authority and confidence about [the MD's] business, their strengths / weaknesses, lack of strategy, the current state of UK manufacturing etc' (G10). This could be classified as a critical incident in that it was memorable and short lived, but G10's next statement demonstrates that it was also reflective: 'Towards the end of the meal, I did realise that there would have been no way I could have conversed at that level without the learning from the MSc.' (G10). What is interesting here is that, from G10's description, reflection took place at the time (Brookfield and Preskill 1999), and not post hoc. The knowledge needed to be in place before reflection could occur.

One interpretation of this example is that the reflection was nested within the critical occasion. It implies overlap of critical incidents and critical reflections, again suggesting things can be classified in more than one way, something that is evident elsewhere. Another example of overlap, but this time between critical reflection and a critical event was described by G8.

> *It was a gradual process during the week. I had expected that, once I had left the IPP environment, the confidence or drive might dissolve but it didn't. The confidence came during the week as the result of interaction with those on the module and reflection on my own part of my career development, skills I had learnt and personal issues. Further reflection after the event just reinforced what happened during the week. (G8)*

This provides further evidence of a gradation of category, with the gradual dawning of confidence and a change in attitude taking place during a critical occasion. Competence in a subject increases confidence and that assurance is greater than the individual components of the education being undertaken.

6.1.7 A Vignette

This last example is complete as it stands. It encompasses both the spirit of the MSc., and many of the issues that have been covered in this section. G9 was one of the participants who responded by email.

> *I think that there were two things that happened, both whilst on the course. When I first started the MSc, it had been fifteen years since I had graduated and I found myself surrounded by a much younger, evidently ambitious intake of students. Although outwardly self-assured and confident, I was initially nervous at the prospect of surviving the course and in some ways 'competing' with this peer group. Subsequently there were two modules, during which I 'discovered' the differences between my perceived and existing*

> *'abilities'. It was during an IPP module exercise that such a group of these upwardly mobile student colleagues laid bare their fears, inhibitions and 'hang-ups'.*
>
> *I was in many ways surprised and relieved to realise that their insecurities were far greater than mine. My self-esteem was reinforced by the gradual accumulation of fairly decent post module assignment marks that compared favourably to my peer group. Leading on from this, I undertook a particular post module assignment for manufacturing strategy. I was asked to analyse the performance of one of our group companies. As a 'scientist / engineer' this was something quite removed from my usual role, but with renewed self-confidence, a fresh eye and armed with a collection of the management 'tools' from the course, I made an assessment, concluding that this company would not survive. Less than a year later my assessment became reality.*
>
> ***So these critical incidences were probably slightly transitional in nature, encompassing a perceptual issue and an actual event that I think embodied learning from the course.** (G9)*

The comments emphasised in 'bold' were his editing, not mine. This quote seems to pull together many recurring themes throughout this analysis to date. There is lack of confidence at the outset; the gradual dawning of confidence and ability and the acquisition of a useful tool-kit. Once more there is confirmation of the whole accounting for more than the sum of the parts.

6.2 Critical Attitudes

This section considers the MSc. from the stance of how interviewees perceived the course at various stages during its life cycle using the analogy of long distance running offered by one participant: Expectations - 'wanting to do it'; Modules - 'intermediate races'; Frustrations - 'injuries'; Growing Confidence - 'the final slog to the finish line' (G9). This approach was chosen because it reflects the use of time used in the first section of this chapter to identify types of critical occasion and it follows another theme from the previous chapter, that of attitude. The previous chapter discussed expectations from a practical perspective; this section introduces an attitudinal dimension.

6.2.1 Expectations

I expected an array of emotions from delegates about starting their MSc. For some the leap into the unknown was after leaving school at sixteen: 'I think because I came from the bottom as an apprentice' (A2). For others, the hurdle was starting from a long way downstream, the gap since formal education had ended: 'just getting back into the study thing after a six year break from my first degree' (G6). Most participants felt they had some barrier to climb at the beginning of the course:

> *I had been out of academic learning for twenty years. In a way, although I wouldn't have admitted it at the time, it was quite scary...but I started off with a level of determination to do well. (A10)*
>
> *I started off with great enthusiasm because I wasn't being stimulated ...frustrated at work, and I wanted to do something to challenge myself....I don't think that has depleted, the only thing I have less of is time. (A12)*

Lack of confidence at the start of the course is clear here and substantiates the view that one benefit of the MSc. overall is increased confidence. Expectations varied: 'I thought I would be taught...I expected to be given all the answers' (G5); 'I don't know what I was expecting, but it wasn't what it was...I have got far far more, it is much broader' (A21); 'Did I understand I would gain that kind of awareness? Not so sure' (G1). At the other extreme:

> *I started off absolutely terrified...half way through the week I felt I had gone in too deep here...but once I did the PMA I felt it wasn't that bad, some of it must have gone in somewhere. (A10)*

The emotions expressed here are similar to some raised in the previous chapter, but also similar to others who had classified them as critical occasions (A1). This suggests that what for some may be a critical occasion for others is a reflection.

Enthusiasm was to be expected (Dennison and Kirk 1990), and voiced on several occasions, 'I was certainly enthusiastic at the start, because it felt like a good time to go on the course' (A9); 'You start the course with great enthusiasm' (G10); 'started with pure enthusiasm' (A6); 'when I first started I was keen' (A5); and, 'I did see it as a great opportunity' (A1) being typical rejoinders. Starting with enthusiasm that tailed off slightly also occurred (G8, A4, and A8). These views draw a parallel with critical phases already discussed and can also be likened to Kolb's (1984) learning curve.

Some felt their enthusiasm had remained throughout the programme: 'My attitude to the course has hardly changed at all' (A8); 'I [am] really enjoying it, there [is] a lot of enthusiasm' (G3); and 'there isn't one module I didn't enjoy' (A10). Single-mindedness and good time management skills are also helpful attributes highlighted by A8: 'I put certain constraints on myself before I started' (A8). There is a glimpse here of external influences, some of them self imposed, placed on candidates: 'I vowed never to cancel a module' or 'never to hand in a PMA late' (A8).

Some of the external expectations increased over time:

> *I had a job of work to do and I wanted to get through it. It is imperative that I pass every module. That is the overriding factor. As the modules [went] on, the workload has increased tremendously. (A4)*

Reflective views were expressed relating both to the beginning of the course: 'I knew there were a few motivations' (G1) and during the course itself: 'there were certainly moments when I reflected on the magnitude of the task' (G9). Reflections about why the MSc. was undertaken in the first instance included wanting 'to get a strategic view' (A2); 'to move on and to take on more responsibility' (G6), and wider awareness that 'one of the building blocks for that was a further educational qualification' (G1). A desire to tackle something was expressed by A4: 'I have always believed that if you put enough effort into something you could achieve whatever' (A4). As soon as he had completed his previous course he set about 'badgering to get on this course' (A4).

> *[My attitude] did change really...taking the break didn't help, because I was quite enthusiastic, I had everything planned out.... But by having to take the sabbatical messed the timings up. (G4)*

A more common scenario was 'enthusiastic at the start' (G2) then declining to a 'steady state or routine' (G8) before the finish line appears in sight' (G2). One frequently cited reaction was initial enthusiasm that having reached equilibrium developed into frustration on occasion. Often the cause of delay was beyond the control of the participant.

6.2.2 Frustration

During any course a variety of emotions may ensue. Enthusiasm can give way to despair and frustration. Some interviewees went through the gamut of emotions. A3 had completed his modules and reached a plateau with his dissertation which led to frustration: 'Only as far as being bothered to do it, I have no heart to put into my dissertation at the moment' (A3); 'I am just going through the motions' (G4); 'physically getting stuck into it was a problem' (A10). Frustration and despair might be expected at the outset 'I was certainly enthusiastic before I started...then I felt I was going to go through a period of frustration...but I have to say that I have enjoyed virtually everything that I have done' (A9).

G7 anticipated that with 'all the buzz words' he might 'get very frustrated' and found that he 'still [did] to a certain extent' (G7). For some there were 'phases of frustration and despair' (Kolb 1984), for example 'I feel now the course is holding me back' (A6). Reasons cited included 'difficulty finishing modules in time' (A3); or perhaps a 'lower than expected module mark' (G6) also disappointed. For others a job change meant having to push against the barrier of company resistance as well as mid-term blues: 'As time has gone on, it has become more and more of a struggle' (A5), but his will to continue prevailed. As a condition of joining his new company A5 insisted he continued with his MSc. Reluctance on the part of an employer could dent confidence, or it could increase determination.

Some participants needed a break: space for work commitments, changing jobs or for personal reasons were all cited. This occasionally led to being thwarted, almost bordering on resentment:

> *Frustration, I had to take a year out due to the new aircraft...As I have progressed [career wise] my responsibility has increased making completion very difficult, and disappointing.... There are quite a few who have done it in works time, and I haven't. (A11)*

Sometimes frustration caused by a mismatch between theories promulgated at MFG and workplace reality was 'demotivating and demoralising' (G2) with little opportunity to develop these skills in the workplace:

> *You see these tools and techniques in use, and you are very inspirational while you are here [Midshire]. You are away from work and can practice these things. You go back to work thinking I am going to make a difference. Then you get back and you can't...and you know, that's quite frustrating. (G2)*

> *I knew I had more to offer, I just wasn't getting it across. I was stuck in a self-fulfilling prophecy that I would bitch and moan about things...I had to break free a little bit from myself and I wasn't giving myself the time to do that. (A12)*

During the two-year taught element of the course delegates may have been promoted or changed job-roles. This alone could lead to external pressures and frustration: 'I had just really had enough by then... I really wasn't wanting to be away...wondering what was going on at work' (G4).

Not everyone felt frustrated: 'I don't think that has really happened to me' (G3); 'I never went through the frustration, the anger that some people did' (A2) and 'despair and frustration was something I never thought of or experienced' (A8).

> *I never really felt frustrated with [the course]: sometimes tired, sometimes stressed because of work pressures. In the back of my mind was always the awareness that I was extremely privileged to be on the programme. (G8)*

Discussion about frustration touched on module content and quality sporadically: 'if the subjects have been hard, like trudging through mud' (A2), and 'if you have the odd poorly run or badly organised module that affects you' (G2). MFG's quality review process highlights if problems are developing on particular modules and prompt action is taken to resolve any issues arising. Once interviewees had completed several modules they knew what was expected of them:

> *Undertaking FACS as a first module did leave me wondering what I had signed up for. Subsequent modules were generally easier to cope with, although this was probably partially attributable to having gained some understanding of expected standards. (A7)*

Completion of the required modules facilitated a more relaxed approach 'once I had got my [required number of] modules it became a bit of a chore' (A3); 'I just wanted it

over...it's very difficult to summon up the drive to complete your last four or five, to a high standard' (G10). Just as frustration and despair set in, the end is in sight, and realisation that completion is achievable:

> *There is the huge relief of finishing the 'taught' element of the course, knowing you have passed. Life's good again. (G10)*

Frustration can give way to increasing confidence; that in itself may increase motivation and act as an incentive to complete the course. This confirms that most delegates go through a curve of enthusiasm, steady state, frustration and finally completion. This can be matched to the increasing confidence evident from the critical occasions described earlier and reiterated below.

6.2.3 Growing Confidence

Growing confidence, a theme from the previous chapter follows on from the section above: 'a bit of the course comes out, you become more confident' (A4). This confidence is demonstrated by G3 'going on modules like INS, teaches you to think. After that I probably went about learning in a slightly different way' (G3). Confidence encouraged the ability to 'link it all together and make the connection' (G4), but a certain amount of determination was also useful:

> *The "glass ceiling" effect of not having a degree.... I was and still am ambitious and I needed a third level qualification in order to progress. (A8)*

Concomitant with increasing confidence was 'meeting with others, in classrooms and breaks, listening to others and what their problems are helped to solve your own problems' was top priority for A11. Networking can have its downside too: 'Sometimes it can be a bit daunting...plunged me into the depths of despair, I thought I would never fit in' (A21). When asked why she continued, A21 replied 'I don't give up, definitely don't give up, not part of my personality'.

6.3 Summary

What becomes clear from this chapter is that participants' critical occasions are well in line with the variety of critical happenings described in the research literature. While there may be different ways of classifying these critical occasions, it is also possible to place certain occasions into different categories. In addition some critical occasions may include other types of happening within their boundaries. From this initial classification of critical occasions one area for further development could be creating a taxonomy of critical occasions. In keeping with my 'quantitative roots' the table below summarises the number and type of critical occasion showing how I have classified them from anecdotes offered by the interviewees.

Having kept the two subsets separate in the previous chapter it was possible to identify differences in the attitudes and language of each group. However attitudinal and language distinctions are now becoming blurred. This suggests that the similarities

between Graduates and Apprentices could be beginning to merge during the course. Some of the examples proffered provide a glimpse of the positive image of the course emerging in this chapter.

Tabulating the frequency (Bloom and Fischer 1982) of critical occasions provides confirmation of my classification.

Critical Occasion	**Apprentices**	**Graduates**	**Focus group**	**Total**
Critical Moments	1	2	1	**4**
Critical Incidents	4	2	1	**7**
Critical Events	7	3	0	**10**
Critical Phases	2	6	3	**11**
Critical Methods	2	0	0	**2**
Critical Reflections	4	5	0	**9**
Total	**20**	**18**	**5**	**43**

Table 3 Summary of Critical Occasions

Stepping back from the critical occasions described it seems apparent that the Apprentices had more pivotal occasions than did the Graduates. There are more critical occasions at the longer end of the spectrum provided by the Graduates.

It is also evident that there is no single factor that determines the success of the programme, but more several different facets of the course that affect individuals in different ways, the results of which are greater than the separate components. The Kolb learning curve of enthusiasm, steady state, frustration and completion could represent one successful model of a student learning cycle during the course. Further investigation would be needed to confirm this.

Growing confidence is an expected outcome from the course (Woods 1993), and the next chapter considers reasons why and how that is achieved. It reviews the method of assessment and relates this to the increased professionalism of participants.

CHAPTER SEVEN

7 Learning to Drive

This chapter reprises the themes of background education and module choice from the early interview questions and combines it with delegate attitudes from the previous chapter to examine the outcomes of the course using the remaining interview questions. The chapter examines whether learning techniques have changed and the impact of using PMAs as an effective means of learning is detailed. It demonstrates the extent to which MFG achieves its stated objectives of giving students problem solving and decision making skills from a platform of technical, commercial and operational knowledge of a business (Midshire 2002f). Networking as a vehicle for learning is elaborated and the impact of the whole course on the professional development of the group discussed. I included the reflective questions here because I felt interviewees would be more relaxed and willing to respond.

7.1 Reflections

The previous chapter identified participants' reflections of their own critical occasion. These reflections were instinctive, usually in response to further questioning. The last two reflective questions asked the group how their early memories had changed.

7.1.1 Early Memories

Marketing brochures portray exciting scenarios about education courses all too readily. No bland prospectus could prepare participants for the learning environment into which they are catapulted at MFG. Asking students to recall thoughts about their hopes prior to starting the course might have identified some frustration or uncovered a mis-match between their expectations and reality. If this was the case, it was not apparent. Although a range of expectations was promulgated there was evidence of a thirst for learning and an emergent sense of eagerness.

> *It was wide open, I knew what I wanted to achieve...I knew where it would lead and the level at which I could work. (A9)*

> *I went into the MSc. with an open mind about the learning experience: I just knew I wanted to do the programme. (G8)*

A willingness to share early worries appeared:

> *I probably wouldn't have admitted it at the time, but the whole thing was quite scary to me. They were all a lot better qualified than I am; a lot of them are younger than I am. I started off with a level of determination to do well...the enthusiasm for the learning cycle was there all the way through. (A10)*

Early recollections suggest delegates recognised the benefit of knowing 'how a business functioned...the whole business, not just engineering' but also that 'some modules are a

bit of an overview' (G7). His observations related to academic constraints rather than criticism of module content. Knowledge acquisition was not always a top priority.

> *My view was to gain a qualification, and I guess it was to gain some more knowledge.... It was definitely about business, management, and leadership, those kinds of things, and to fill knowledge gaps. (G1)*

Some participants were aware of the programme structure from previous students. For them this might reduce the unknown elements, but could heighten possible misconceptions. A8's expectations were high because of the 'number of people who had completed the MSc.' (A8). On the same theme, G1 said the course came 'highly recommended by a number of people' but adding a people dimension: 'people enough for me to trust' (G1) to justify doing the course.

A8 was sufficiently self-aware to know his preferred 'learning style [was] experiential' (Knapper and Cropley 2000) and he knew enough about the 'Midshire model of presentation, - then syndicate groups' (A8) to know that it suited him. For G1 this was not so clear-cut: 'did I understand I would gain [this] kind of awareness, not so sure'. These preconceived ideas about the course were explored further. Both interviewees felt the course had more than met their expectations.

> *I have become more intolerant of presentations – [I have] more of a get into it and see how it works sort of attitude now. I firmly believe the only way to assimilate knowledge effectively is by making mistakes. (A8)*

Although A8 felt he had developed a more proactive style during the course, he judged that 'Midshire did not really allow for the process of making mistakes' (A8). This is an interesting observation, one that perhaps MFG should consider. It may be that PMAs could provide more opportunity for experimenting. Some negative feedback came from G4, but this related more to her work / MSc. relationship than to criticism of Midshire.

Some participants felt their mode of learning had not changed as a result of taking the MSc. A4 implied the course had not altered his learning style, but that his attitude towards learning reflected his early childhood work ethos. He held that he had 'always imparted the knowledge learned to [his] team' (A4). He described tools acquired on modules that he passed on to colleagues, because he did not 'see knowledge as power or, as something that should be kept to [him] self'. This suggests that A4 already had the ideals adopted by MFG.

Good time management helped A2 to 'know what is important, and what is not', which was linked 'networking with people inside the company... the Midshire Mafia as it's known' (A2).

> *It has almost become a stigma – the four of us are [now seen as] academic...and people are like "what <u>is</u> all this about?" (A22)*

This adds further credence to the idea that the sum is greater than the individual parts. In some instances it led to resistance from colleagues: 'you lot at Midshire' (A21). She was able to turn this attitude round to get her 'ideas accepted' on occasion.

Engineers are not usually seen as reflective (Blowers 2003), this section demonstrates that they can be. It is evidence also that they can think reflectively during the course and use this skill in a positive way to improve their management skills, for the benefit of both their employer and themselves. It is an indication that professional skills are increasing (Tripp 1993). This can only encourage increasing confidence and ability to benefit from the learning outcomes. What emerges is a group of people eager to advance themselves, carefully selected by their employers as being able to maximise the benefits offered from this type of education.

7.1.2 Assimilation

Careful module construction and implementation promotes assimilation of knowledge and new ideas for participants. Several delegates confirmed their understanding had increased over time: 'ability to assimilate knowledge has most definitely improved' (G10); 'knowledge assimilation is getting better and better...at pulling out [pertinent] information and disregarding the rest' (G1).

> *I didn't have a specific plan about how I would assimilate the content of the program: I really wanted the whole thing to "wash" over me and soak me. (G8)*

> *I expected assimilation of the knowledge to be more difficult. I have spent twenty years in industry and I knew <u>what</u> I was doing but I didn't know why. What this has done is given me the <u>why</u> I am doing things, and some insights into what I can do better. (A22) [Emphasis in original interview]*

G3 attributed her greater ability to absorb information to being able 'to think in a new way' that encouraged her to go 'about learning in a slightly different way'. A11 reflected that he 'no longer needed to go through the numbers, I can see the trends and look where we are going'. This view was supported by A8 who described having 'a feel for things that definitely wasn't there before Midshire'. He thought his newfound confidence enabled him to 'read situations and people' more accurately. He continued:

> *after the course I was able to sense that people were not telling me what they thought they were telling me and I was able to tease out the real issues by using open and closed questioning techniques.... This new skill has been sharpened considerably...and helped me manage different people in ways that they are most responsive to; and get more bang for my buck.... My senses have sharpened in that I can tell by watching people communicate and usually, I mean almost always, tell if there is something else they are not telling me. Body language*

> *and active listening are key skills for me now especially when dealing with [international contacts]. (A8)*

Both examples demonstrate Freidson's view of people developing professional expertise by 'taking the time to go through the training' (1994:157, 2001:87).

Practical application was mentioned by G2. He connected improved assimilation to the idea that knowledge is best related (Liveright 1968) to 'something you are doing, or have an interest in' making it possible to 'apply it' (G2) in the workplace. Ability to identify with something encourages 'far more enthusiasm' (G2) as Dennison and Kirk (1990) identified with their virtuous circle. G10 supported this theme propounding that Midshire provides an 'understanding of the basics' making it easier 'to grasp more detailed facets' of a topic. He drew analogy with learning to drive.

> *If nobody showed you what to do, it would take ages to learn. However once shown the basics, it doesn't take that long to 'learn the ropes'. (G10)*

G9 joined the course with no 'set ideas at the outset about knowledge dissemination', but expected 'this was an inevitable outcome'. He attributed his increased capacity to assimilate knowledge to two things:

> *An introduction to a wider perspective of the business world, problem solving etc. and a greater array of new 'tools' or models on which to base and use this new knowledge. (G9)*

An analytical view was proffered by A8 who identified being able to 'distinguish between the trivial many and the vital few'. His improved capability to 'make a decision quickly', based on his 'understanding' suggests the MSc. gave A8 the confidence to think on his feet, an important quality for a manager. This is confirmed by the idea of knowing 'in what areas expertise is absolutely necessary, and what not' (Freidson 1988:336).

Although there was evidence of change in assimilation patterns, seemingly not everyone responded to the same degree. A4 sensed that he had not 'changed' because he had always 'passed on' information he gained from Midshire. His first response to my question was that he had maintained the status quo, but added that the course had made him 'go into areas of the business that [he] wouldn't [normally] have gone' (A4). His reflection introducing a wider dimension he might not have considered without prompting.

A more reflective question for delegates to answer was how their knowledge assimilation had changed from their initial expectations. G6 expected assimilation to be 'by PMAs'. He found this was true and that he 'became better at applying the knowledge [learned] in the post module work' (G6). This lends credence to the importance placed on application by MFG to establish the learning (Reynolds 1996).

G2's initial expectations were based on his undergraduate experience. He found that 'they are totally different: like chalk and cheese', not anticipating there would be 'interaction and conversation with others'. G2 judged the main difference to be that discussion with 'lecturers and academic staff is more stimulating' (Hill 1969:15). Networking helped G2 assimilate the learning because he could relate to examples from others that 'brought the memories to life' (G2). This reinforces the underlying philosophy of the MSc. as being integrative and participative (Reynolds 1996) a key feature of embedding the learning. Moreover, it raises the profile of networking.

Expectations and assimilation converged for A6. At the outset, he had expected 'to be able to run [his] own business'. This view mellowed over time and now he felt he 'probably could'. His greater awareness of important business issues implies broader understanding and awareness of his own limitations. A6 considered his 'ability to assimilate knowledge' developed during the course, and he improved his PMAs by looking for 'alternative avenues of information' to enrich his work and improve understanding.

For many interviewees (e.g.A1, A3, A5, A6, A7, A8, A11, G2, G3, G4, G5, G7, and G10) assimilation increased during the course. Modules have a constantly changing tempo. Activity and delivery style within the lecture room help to maintain interest during sessions. Increased assimilation may be due to the integrated approach to teaching, the variety of delivery methods, and the type of PMA ensuring that most participants benefit from the programme.

Some who provided a deeper insight into how the learning had been assimilated associated it with PMAs.

> *I think you spend time learning a lot of theory, but it is not until you go back to work and do the digging around at work that [it] gives you the understanding of your own business, which is, I think, what Midshire is probably wanting you to get out of it. (G3)*

> *In some ways you have a feel for how things work, but [it is] not very focussed, and sometimes after the module, the question at the end forces you to do something specific. (G7)*

These participants imply awareness of MFG's reasoning. Perhaps increased professional confidence (Helsby 1999) comes from realising there may be some logic behind certain of the PMAs as well as a learning opportunity.

For A4 reflection crystallised at the end of the taught phase of his programme. He thought he had now 'got the big picture', which enabled him to 'understand a lot more company procedures'. It resulted in his feeling 'more comfortable and confident in doing [his] job' and that he 'can cope' (A4); an excellent indicator of growing confidence (Harrington et al 1996).

G2 observed that networking had facilitated his assimilation most. It was based on the premise that 'most people are willing to learn...most people open up and tell you about

situations they have gone through'. This provided scenarios to which he could relate (Kolb 1984), and from which he could 'apply some of his learning'. He needed the benchmark of 'other people' to give him the confidence to think 'if they have done that, perhaps I can too' (G2). Not all comments were positive. G7 described a tension between the specific requirements of PMAs and a desire to 'revisit the whole thing in a general way [to] reinforce the learning'.

Taking a definitive stance, A2 felt his capacity to assimilate had not changed, 'I still put in as much time now' (A2) measuring time rather than effort. The process he used was still 'the same way as [he] did the very first one' (A2). His approach to PMAs was structured: 'I do it over a period of time' trying to complete it 'in the fourth week... [and have] two weeks off' (A2). He was not someone who could leave it to the end, 'I need to get it in the post' (A2).

Assimilation for most participants has improved, although not always in the same way. It is helped by exposure to a wide variety of tools, ranging from quantitative techniques to body language. The course offers something for everyone, and most scenarios. Discussion about networking (Sarason et al. 1997) confirms suggestions that a mutual support system may develop outside formal modular activity. Occasionally assimilation was related to PMAs. The next section discusses this in more detail.

7.2 Post Module Assignments (PMAs)

Post Module Assignments are an integral part of the learning process at MFG. The interviews sought to establish how participants used PMAs to embed the learning and whether they were seen as a beneficial or necessary evil. For A21 the PMAs were 'the worst bit and the best bit'. Once marked PMAs were returned to delegates they had 'a peg in the ground' (A5), which acted as a benchmark: 'As time has gone on, I have become more confident at doing well' (A5).

Two main approaches to PMAs were possible. One method was students using PMAs to relate module content to a work-based problem. Alternatively, the PMA was something with a wider boundary. The analysis uncovered both of these models, together with combinations of each.

7.2.1 Work Related PMAs

More Apprentices than Graduates applied work-related issues to PMAs. This may have been due to their early training, but none attributed it to this directly.

> *Everything I did was related to work, and I have insisted [that] the people that work for me now do [PMAs] for work. (A3)*

> *Most of them were, without a doubt. Some of the strong ones that I did...went straight back and were used at work. (A9)*

Sometimes the PMA was expanded to find out more about the business than simply reviewing existing business processes such as: 'confirming the price structure, and that

what we are doing are the key drivers' (A2). This is an indication of module content being used to test sound practical ideas (Romer 2002) against the backdrop of a theoretical framework.

A8 considered his approach to PMAs 'remained consistent', if not always linked directly to work. 'If the module was interesting then the PMA was no problem in terms of application' but 'when the module was **** then effort' (A8) was equally poor. He added that if he were not interested in the module then all he would want to achieve would be 'a tick in the box'.

G2 'always tried to apply [PMAs] somewhere at work' whenever possible, citing interest in the topic as being 'half the battle' (G2). A key message is that interest must be maintained by making PMAs as relevant as possible. Once participants have returned to work other interests and pressures cloud the horizon including the span of module material, and the diversity of interests and backgrounds of delegates.

A10 had no initial expectations, but realised very quickly that:

> *There was a huge potential for the application of the knowledge within the work environment, and in some cases outside the work environment...for example ASM. I was able to come back and do something of value to the company. For me that was hugely powerful. (A10)*

One NRG adopted a different approach to ensuring PMAs were work orientated. She developed a 'coping mechanism' (Boud, Keogh and Walker 1985) and took mainly operations based modules, but to complete the degree needed to take technical modules:

> *I had to do them and I made myself do them properly.... For IE, I didn't improve a process we had; I evaluated the existing process instead. (G5)*

A3 was a firm believer in 'experiential learning' (Kolb 1984, Liveright 1968, Powell 1985) He felt 'you learn more from doing things wrong' because he had 'always learned by experience'. Another dimension offered was that you can also 'learn from [other people's] experiences and failures' (A3) which may be forthcoming in the lecture room (Van Ments 1990), or when networking. Practical issues appeared again. Applying time management techniques meant 'you could spend time doing [the PMA] at work' rather than 'trying to kill yourself' (A3).

For A11 doing a work-related PMA enabled him to 'rummage round in work-time as part of [his] job; no-one is surprised...and it makes it so much more relevant too', linking theory and practicalities together.

> *You get out of it what you put into it, but if you're interested in the subject and you can apply it to your everyday job, then it makes life so much easier, and it is easier to get through the PMA doing that. (G2)*

> *The PMAs became a bit of a grind, but once I managed to get started on them I quite enjoyed doing them. My attitude did change a bit towards the end because a lot of the learning comes through the PMAs. (A10)*

Evidence of cognition emerged when A8 suggested some PMAs gave him a broader 'understanding of how the business operated' (A8). Perhaps there is a fine line between being 'not interested' and addressing 'wider business issues' that should be monitored carefully.

Although A9 applied the PMAs whenever he could, frustration occurred once when he 'couldn't get out of it what [he] wanted', feeling it was a missed opportunity. He reflected that:

> *I have always used PMAs for my work...even if that has been damaging to some of the marks, to try and apply some of the learning and the research back at work. (A9)*

Positive benefit from a work-based PMA happened to G6, resulting in his promotion. A particular PMA led to work on a joint venture in Chile. Here his use of theory was matched with practicalities in the workplace with a beneficial outcome. The twin themes of learning and application emphasise MFG's integrated approach very clearly. A7 used 'every opportunity to base [PMAs] around real work situations' and while they 'did not always benefit the business directly' he used them as a means of comparing how his company 'operated with the Midshire version'.

One Apprentice who used 'historical examples' to complete his PMAs, said that after the 'first four or five modules' he realised that diminishing returns were setting in. By reducing the time spent doing PMAs his final mark went down, but his level of effort was greatly reduced and he 'still passed' (A22).

Those delegates who opted for practical application of theory to PMAs benefited from embedding the learning, saving time and occasionally saving their employer some money. This pragmatic approach suited more Apprentices than Graduates.

7.2.2 Non work-related PMAs

Participants who chose to do only non work-related PMAs were all Graduates (G1, G6, G8). Some Graduates found it more difficult to relate some of the module content to their day to day work: 'If it doesn't relate I am not interested...I am, but it doesn't engage me in the same way' (G1). This might suggest immaturity, that they were interested in a much bigger picture or merely a self-centred approach. There was perhaps impatience in some answers:

> *They did not benefit my work or dissertation; however, certain elements did – notably the Manufacturing Strategy, and Business Law modules. (G10)*

> *I think some of the modules I have done have not related to me at all, but they are a requirement of the University. I would struggle to find a way to apply the learning. I am not saying that some of them aren't interesting; they are just not beneficial to me at this moment. (G2)*

This narrowness of thought was unexpected given the views about broadening knowledge expressed in chapter 5 by some Graduates. Their seeming intolerance of certain modules might be an instant decision rather than a measured one: 'I relate the module to work in my seat, as I'm going through' (G1) being a typical comment. It may be this narrow-mindedness relates more to the stage reached in their career, and may be due to their university education or differing work experience.

Another dimension to this apparent dogmatism was posed by G8 who described making a conscious decision not to 'use the PMAs as a method of testing work based issues'. He seized the opportunity to 'to deal with issues not really related to work' (G8) as a broadening experience which in the longer term might benefit his career. This, more selfish approach, is not beneficial to his employers in the short term, but not detrimental either. It emphasises the broader approach of some Graduates.

The influence of networking emerged again here. G1 said he got 'more from the engagement of the other people and the module tutors than from any dry book' (G1). He felt the people interface 'had given [him] confidence', because of his awareness of a better picture of business. G1 acknowledged the boundaries of his existing knowledge (Eraut 1999).

> *It has shown that a little knowledge is a dangerous thing. It has also shown that the breadth of knowledge that's still out there is huge, that the more you learn the less you know. (G1)*

The experience of changing employers reappeared with G4 in relation to PMAs. She 'had to be determined to finish it...people weren't really looking at what [she] was doing'. As a result, G4 changed her PMA strategy so that she 'did things that would benefit' her and not her company (G4).

The other interviewee who changed employers, issued an ultimatum prior to joining his new company, took a different approach. Having completed more modules, possibly gaining more confidence, and with little support from his new employer, A5 deemed that PMAs became 'an exercise to get the mark'. On further questioning A5 reflected that his scope for absorbing knowledge through PMAs was reduced as a result of this approach.

> *I didn't have the opportunity to talk it through with such a wide [audience] or access to some of the specialists. I found it difficult to find a person who could see the broad picture. (A5)*

This confirms that company support for participants is not merely about paying the fees, but providing ongoing in-company support of different kinds and validates the MFG approach. Whilst not part of the original research design, with 8% of the total cohort,

and 100% of those who changed employers, this cannot be overlooked. The impact on students' ability to benefit from PMAs may be in part a function of the level of employer support.

The quest by most Graduates to broaden their knowledge matches the extensive education most have received to date. Overall the interviewees described increased levels of learning. PMAs seem to have contained sufficient diversity to accommodate the vicissitudes of participants. There was something for everyone somewhere along the way.

7.3 Going Solo

The final section of the interview schedule concerned changes highlighted by interviewees as a result of taking the MSc. Participants were encouraged to reflect on how they had changed since starting the course, whether in their peer group (Glaser 1999), or as an individual in relation to attitudes, awareness, or professionalism (Ozga and Lawn 1981): 'It has changed all of them' (A21). Issues that emerged include increasing confidence, networking and professionalism. This section draws these themes together.

7.3.1 Growing Confidence and Wider Horizons

After completing the taught element of the MSc. one outcome could be increased confidence. Once their modules are complete candidates know they are half way through. It means participants must rely more on their own capabilities and what they have learned from modules, while preparing their dissertation. Awareness of the bigger picture is vital if the project is to be completed successfully, but an appreciation of how the jigsaw fits together is an added advantage.

> *Far more positive, proactive attitude. Far more willing to go out on a limb, take risks...because you can see the benefit. If you take the risk and try it, the worst that can happen is it can fail and you go back to the status quo. The best thing that can happen is it is an outstanding success, and everyone benefits. (A21)*

> *The principal change stems from having a far better understanding of some of the broader business issues, along with the ability to make far better informed decisions based upon knowledge accumulated. These factors increase credibility considerably. I am now able to participate in strategic planning discussions with both senior management and subordinates with a far greater degree of confidence and knowledge. Greater understanding gives the confidence to challenge and offer counter arguments to suggestions that I might have previously gone along with, rather than risk challenging them on the basis of incomplete knowledge. (A7)*

> *I was Luddite in my approach. My attitude towards academia and what academics can offer the business environment...was that there was nothing I can learn from these academic places. My attitude towards that has gone through a sea change.... The way I behave in meetings has changed significantly. (A10)*

These statements demonstrate growing assurance and sensitivity to issues that might arise from knowledge or understanding of a business. Sensible decisions are a vital aspect of management, without them a company might fail. Awareness of wider horizons aids decision-making greatly: 'the more you know about different things, the better standpoint you reach when it comes to decision making' (G1). Some managers place more emphasis on the immediate tasks than the strategic ones, a more traditional fire-fighting approach (G8, A8). G8 identified 'urgent issues' as vital to enable him to filter them out and thus 'focus on the important few' (G8). This reflection indicates sound managerial skills.

A9, a licensed engineer, compared his professional qualification with the MSc:

> *You are basically licensed by our country to sign civil aircraft out...it shows you have reached the standards...the MSc. does so from a rounded business perspective.... I feel incredibly more confident to take on other things. (A9)*

He continued, saying that 'although [he] was still an aircraft engineer at heart he felt he could now go anywhere 'in the business – from baggage handling to the property portfolio...it's great'. The MSc. has given him the confidence to approach any area of operations because of his professional development (Perry 1997).

Academic dimensions were introduced by A5, who linked his 'headlight' incident with change by describing the 'masses of models' thrown at delegates. With a practical background, there was a hint of cynicism when he continued: 'that's all very well but what about the real world' (A5) (Etzkowitz and Leydesdorff 1997). Offering a more reasoned perspective he added: 'there is a lot of merit in some of these conceptual models, they do have some relevance' (A5). Here is a connection between academia, industrial relevance, critical incidents and change. A11 also adopted this theme:

> *People who work for me...know that I have done it operation-wise but now I have got the academic background I think they expect from me a balanced view. It has rounded me if anything. (A11)*

Being aware of different business perspectives should be framed within other facets that affect the overall commercial picture. Knowing how different systems operate does not mean all the cogs can be connected together without considering the associated people and cultural issues.

> *It made me more aware of developing people. Having come into a role where I was actually responsible for people, it made me aware that you are not just training people. (G4)*

Attitude can affect confidence in different ways. The people dimension was important for A8 as he became 'more aware of the reactions of others in terms of them to me and vice versa' (A8). Occasionally delegates used their new skills to create a particular effect attributing these skills to the 'broad brush of the MSc.'. A8 reflected that he had:

> *Developed this persona of* someone who should be listened to.... *Sometimes people are guarded in what they say because the recipients of the message might not like it. – I, on the other hand, really don't care if the other people do not like "it" - I will always be truthful. Result – People listen! (A8)*

The Apprentices' view that they were 'here to learn' came across again at this late stage in the interviews. A2's enthusiasm was apparent: 'I still want to learn. It's not just a tick in the box.' (A2). A glimpse of antagonism came across here because he felt some Graduates were:

> *Just doing it because it fits in... but if you are not going to learn anything why sit here for a week.... Why be bored [here] if you can be bored somewhere else. That's the way I look at it. (A2)*

This is in contrast to opinions expressed by some Graduates that the week at MFG offered an opportunity to reflect on current work problems away from the workplace: 'modules at Midshire are a good break from the work routine' allowing 'me to float' (G10) as suggested by the DIP and Doty.

Attitude, confidence and networking all merged for A1. He chose to come to MFG to benefit from the 'mix of people' both to him and to his company. He suggested that networking happens, but what he gained from MFG is more expansive because 'other people do seem to be quite happy to pass on and share their information with you' and his original instinct was 'more than proved by coming to Midshire' (A1). Those students who made a positive decision to join MFG (e.g. A1, A2, A11, G1, G4, G6), appreciated the benefits of having done so. No-one mentioned preferring an internal programme to the multi-company one. This demonstrates the ability of MFG to create a learning environment where very different individuals feel able to share experiences.

Growing self-assurance is not only reliant on taught modules, but forces outside the course exert influences too. Increasing confidence enabled G3 to 'realise what [she] was good at, and not so good at' (G3). This led to her understanding why she was 'de-motivated...because [she] was not using a core skill' and 'prompted [her] to job hunt' successfully within the company.

Similarly 'changed general expectations' made G8 recognise that he had 'more to offer than just plodding through the day-to-day...as regards [his] career' (G8). G1 added a note of caution by suggesting that not all his change was 'due to the course', but some may be 'influenced by general experience' and 'maturity in age' (G1) (Whitbeck 1998). There are indications that reflection and an ability to associate apparently unrelated ideas together have an influence in increasing self-assurance.

A more circumspect approach to using new skill and assurance was offered by A3 during his interview. He did not, at first, suggest he was capable of promotion: 'I don't see myself going any further in this company'. After reflecting on this possibility he added 'I think I could... they would probably promote me [to MD] in three to four years time' (A3) but unlike some he felt he had 'got all the learning' from MFG.

Increased status can mean participants 'don't accept no for an answer' (A2) in a work situation. Instead they might be asking questions and questioning why? A2 put this 'attitude wise' down to being 'a confidence thing' and being able to 'put decent arguments together means you can challenge decisions' (A2).

> *I find myself in situations where I can talk to specialists from a position of knowledge rather than from a position of no knowledge.... I have enough knowledge to be able to have an intelligent conversation with...relevant [subject specialists] I can understand their language, and they can understand mine. (A10)*

Starting from a different point G5 (NRG) said she 'suffered horribly from lack of self-confidence', but when quizzed about the change to her peer group and professionalism (Woods 1993) she followed this up with:

> *I felt more confident. I knew that I had theory to back it up; even if I couldn't actually find the page in the book...[it] gave me confidence to deal with the people on my level who are engineers. It doesn't make me bad at what I do, what I can offer is different; it doesn't make it less valuable. (G5)*

Developing poise can result from increased knowledge and skills (Pillay 1998) and also frames cultural capital. It could improve delegates' interface with others. The modular structure means delegates need to 'build a team', and be able to 'react in a group from nine o'clock on Monday morning, sometimes with complete strangers' (G1). Team building continues 'all the way through the week' (A10) and encourages participants to accommodate one another because:

> *You are in each other's pockets. The more you get used to getting to know a strange group of people the less you worry about it. Giving presentations in front of people, I am much less concerned about them now. (G1)*

> *When you are working on a syndicate exercise in Midshire you are working with a group of bright people, with an objective to deliver. It is the freedom that being in an environment without politics without hierarchy...that one realises how much more efficient that kind of working environment is where everybody's contribution is valued. (A10)*

A2 and A6 also mentioned increased ability to present their arguments. This is something engineers are rarely good at (Beder 1998) and presentations using tools and

techniques from the MSc. should improve management effectiveness, and hence more professionalism. Engineers need to be able to put their case across to their management team in order to be heard in a business situation. For A8 'respect in the work place has improved' due to the 'development opportunities' offered because he 'has an MSc.' (A8).

Benefits of completing the course include gaining an MSc., but add up to a more rounded manager capable of moving forward. This section has examined the wider perspectives of changes affecting interviewees during the taught element of the course. It demonstrates that reserved engineers can mature into bold managers capable of far more than the sum of the MFG parts.

7.3.2 Passengers

A recurring theme throughout the interviews was the impact of people. This was either by delegates on others or vice versa. This section reviews how important human interactions are to successful development during the MSc.

> *Awareness comes from knowing that you have got academia here, workplace over here and there isn't a great big gulf between the two. (A21)*

A21 identified that knowledge came from a gradual dawning through the modules. She distinguished MFG from other courses saying that on previous courses she had felt 'that's all very well but...it isn't like that in the real world ...but Midshire made me realise that you can do things like that, and it can be better for it'. She identified the key driver as being the PMAs, because 'you do actually learn...and you gradually start to relate what you are doing at Midshire with what you are doing here' (A21).

One topic mentioned frequently was networking (Fullan 2001, Sallis and Jones 2002). Networking provides another powerful tool for delegates that would be unachievable for them as individuals. This fits in well with earlier ideas that there is more to be gained by sending several people on the course at once than from sending individuals in succession. A2 found fellow participants would ring him up and say 'I have got a problem here, [I] know you might have an idea' about how to solve it. Another benefit was interviewees being able to contact one another to 'see what model [others] had used' (G5) in certain situations.

The effect of fellow students contributed to A5's development as an individual:

> *The opportunity to mix with so many different people from such a wide variety of organisations has been very beneficial. (A5)*

Looking at wider issues is a useful transferable skill (Billett 1996). G4 used this principle to 'encourage people' to look at doing the MSc. citing being 'more aware about what a person needs' (G4), demonstrating management and communication skills when referring to her own staff.

Another facet of networking is developing teams. G8 said the MSc. gave him a 'different perspective from many of [his] colleagues' (G8). His prime reason was that 'applying the teaching in a practical situation' reduced the 'danger that...the MSc. is...all theory and no practice' (G8). He was referring to his ability to build teams at work, but he did have a reservation: that of 'industry based education' not having the 'same impact on behaviours' as 'graduate or earlier education'.

Delegates may develop a 'responsibility to [them] self and other people' because they have 'acquired greater insight through learning' (G9). This puts an onus on participants to 'satisfy [others] increased expectations' but the results will 'depend on individual motivation and application of the new skills acquired' (G9). Becoming self-aware may be the result of the holistic (Lave 1988) nature of the programme.

One of the ways MFG encourages teambuilding is by syndicate work and case studies. Students had differing approaches to syndicate exercises. G4 preferred to:

> *Sit back and listen to what is going on, and then jump in, once I have got a bit more idea. So I tend to be quiet first thing and wait until they quieten down a bit. The people that are very aggressive, and assertive will start off first – "this is what we have got to do". I think it out first then say, "well maybe what you need to do is this". (G4)*

G4 now uses these reflective skills 'at management team meetings'. This is one benefit from the programme that demonstrates the wider perspectives MFG seeks to achieve. Her conclusion was 'it helps you to interact with people you don't necessarily know' (G4).

> *I have become more tolerant of people whom I would normally have found frustrating, and can enjoy more diverse types of people than I used to. (A10)*

For A21, her ability to work as part of a group had 'increased dramatically, and not being frightened to look really stupid', she continued:

> *syndicate work is really good. It teaches you how to deal with people of different types...I modify my approach to people based on the type of person they are...or you don't get the best result from them. (A21)*

Further indications that MFG is in harmony with previous research (Howe, Hill, Bass and Vaughn) came from A10.

> *Syndicates are not always the most relaxed things in the world...but the outcome tends to be a lot better, and you tend to get there a lot quicker.... I always find it so frustrating when I come back here [work] and it is steeped in internal politics...if you could shake all that out of business you could get on so much better. That is a major influence. (A10)*

A10 is a manufacturing director. This is a powerful position, sometimes only achieved by determined people. For him to admit to being more tolerant would suggest he has become a better manager. A10 'tries' to set an example and now encourages his staff to be 'apolitical'. He said he 'used to be a team player' but his life experiences had made him 'become individualistic', MFG had 'given him permission to go back' to being a team player. His choice of the word 'permission' was interesting. Here was a manufacturing director with the confidence to tell a complete stranger some very personal thoughts.

Another interviewee with the same firm felt that he had:

> *certainly learned to work in a team a lot more. I have always been a loner, I don't like people. I am poor at delegating and my time management is poor. I have certainly learned through syndicate work...to delegate things. That has helped me a lot. (A22)*

Interaction for G7 made him:

> *more capable to converse with people on different levels and in different areas, because you understand their language. (G7)*

Concerns about his peers extended to A4's family. He was aware that he had some 'bridge building' to do with his wife and friends, 'being conscious that [he] will have to change' once his 'dissertation is over' because 'the more friends you have the more difficult it is' (A4) to maintain relationships. Teambuilding also applies outside of the MFG environment.

Respect *from* colleagues came as a surprise for A3. He sensed he was 'a good manager - too understanding at times' (A3). At one stage his staff thought he was leaving. He was surprised they were pleased when he told them he was not. They said, "that is good". This could mean A3 is lacking in confidence, or it could be the mark of a good manager. He was not taking his position for granted, and his staff clearly thought a lot of him.

For A8, people issues revolved round the IPP module: 'that definitely influenced attitudes around my personal integrity and how I deal with people.'(A8). G4 also linked people issues to modules 'you get very close to some people very quickly' and this leads to being 'fired off to do different things' (G4). For G7 INS had the 'biggest impact on the way we work' which led to a 'shake-up...and a decision to make motors in France' resulting in his 'working with people who don't even speak the same language' (G7). He linked INS to 'the culture thing being interesting to understand'. These wider implications may be the result of the integrative nature of the programme.

One of the outcomes of this programme is to create effective managers with the skills to manage people and operational change (Midshire 2002e). Very different characters reporting similar outcomes from the programme lend credence to the hoped for MFG outcomes (Reynolds 1994). From participant observations, MFG is achieving this.

7.3.3 Driving Home

Increased professionalism was one of my expected research findings. Discussion about professionalism needed to be sensitive lest interviewees felt undermined. To suggest someone was not professional might be misinterpreted. Delegates placed differing emphasis on the meaning of professional, (Eraut 1994, 2001; McCulloch, et al. 2000, etc) with some Graduates taking a defensive stance.

> *Am I any more professional? As far as my understanding of myself, I have always been professional in the way that I react at work. So I am not sure whether the MSc. has done that. (G1)*

G1 continued by crediting some of his development to 'general experience and maturity' preferring to attribute a more holistic outcome to the MSc. by suggesting it had 'contributed to [him] as an individual on all sorts of different planes'. Professionalism here represents a set of behaviours (Kiesler 1971, Eraut 1999) adopted by G1 in his relationships with others.

When asked the extent to which the course had contributed to her development G5 was unequivocal:

> *Massively....Without having done the MSc. I would not have been able to make best use of what was going on, nor the company to make best use of what I had to offer. (G5)*

A response that became more positive as the topic was thought through came from G3 before reverting to a guarded opinion (Kubler-Ross 1970):

> *I was a professional before. Probably what it has done is encouraged me to be more questioning at work just because it makes you think more. I am less prepared to accept the status quo, but I don't think I do it in any less professional manner. I try to be professional at all times. (G3)*

Responses from the Apprentices were positive. Increased professionalism may come from the greater self-awareness gained from taking the course. A11 highlighted the time when he realised he was 'professional' as being out with friends who were so impressed that he was taking the MSc. at Midshire: 'that is when it hit home'.

> *I have a knowing-doing gap, which I have to work on closing.... If you are aware of it and trying to work on it then that is more professional. (A10)*

> *It gives you an increased range and depth with all the different things you learn. It can increase your ability to deal with different situations and therefore be far more professional about it. (A21)*

> *The impact on professionalism and working practices seem to have followed almost automatically - as your knowledge base and resultant*

> *experience expand, so your approach becomes modified as a result. (A7)*
>
> *It has definitely changed the way I think. I don't make snap decisions anymore. Something I have done all my life. I now put a lot of thought into decision making. I try and use some of the tools and that has had an impact on my professionalism. (A22)*

A7 felt that 'significant improvements...occurred in levels of self confidence'. This arose from his 'feeling of better understanding, and the ability to argue a case based upon sound business principles' (A7). Here is further evidence that MFG's approach of theory and application provides greater benefit than the separate components.

> *From a professional point of view it has very much changed my perspective on [the business] from being very much an engineer to being able to see how a whole company works. Being able to understand some of the decisions that are made that don't make sense from a shop floor perspective, I can see them from a business perspective now. (A5)*

Professionalism and people was another perspective raised by some interviewees. A3 felt it had made him 'more professional, in [his] style with other people' since he now takes time to 'sit down, listen and talk' to people. Improved confidence came through in discussion when he identified himself as 'definitely a different manager' (A3) after completing the modules. An ability to be self-assured is a good indicator (Freidson 1984:2, 2001) of developing professionalism.

> *Now even more professional, now even more aware. I use tools in everyday practices and [my] attitude started to change, but not yet completely how I would like it. I would like to be braver! (A6)*

Another facet of professionalism concerns how delegates perceive MFG in its role of delivering the course in a professional manner. Participants who interpreted professionalism this way might have been critical. None was overtly so. Those who drew comparison with other courses were usually complimentary towards MFG.

Looking beyond MFG, G8 raised the issue of the 'reputation and standard of teaching of the institution itself' (G8). He sent some senior managers to another University and his perception was that 'the standard of some of their work would be totally unacceptable' at MFG. G8 used this to elaborate why he felt the course had a high reputation, and offered more evidence for the professional approach of both staff and students.

One participant identified professionalism with 'rounding off modules' (G4). She thought it could improve occasionally. Sometimes the 'end of the module is a bit loose, leaves me out on a limb...like on the edge of a cliff without a way down' (G4). She felt the people modules had resolved this by encouraging delegates to have an action plan for next steps after the module, which was one way of 'bringing you down to earth' (G4). Whether this could be applied to non-people modules is debatable. She continued:

> *It is like you get in the car to drive home, and you are physically sat at the wheel, but your brain is up there somewhere following you, and that is the way I feel. Not quite together, it is a need to come down; you know it is a weird feeling. (G4)*

Another allegory connecting several themes together came from G10. His abstractions include learning to drive; despair and frustration; increasing confidence and attitude; professionalism and the need to bring people down to earth with a soft landing at the end. He described starting 'the course with great enthusiasm', swiftly followed by feeling 'way out of [his] depth' after the first module.

Being self-aware is an expected outcome from the programme. It could indicate increased professionalism (McCulloch, et al., 2000:62) and that some of the learning has become embedded. Alternatively it can lead to discontent. A3 demonstrated this when he said: 'as far as the future goes, it frightens me to leave here [his company]' (A3). His measured thoughts continued with 'it frightens me to stay here even more' (A3), showing inward and outward looking reflexivity.

A6 summed these attributes up graphically:

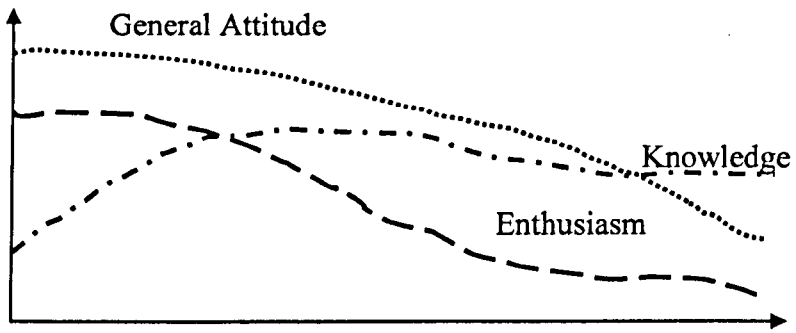

Fig 3: A Personal Perspective on Attitude.

If all the participants had done this, their curves might have had different shapes leading to fuzziness. These extracts demonstrate that participants held several differing views of professionalism, but most felt that the course had made them more so.

7.4 Fuzzy Links

7.4.1 Looking out

How others see delegates who have completed the MSc. can improve motivation. If participants sense that regard from others has increased during the course this may enhance feelings of professionalism and respect. A7 described how participation in the programme 'seems to have altered peoples' attitude' toward him. A form of continuous improvement (Dennison and Kirk 1990) could develop whereby greater respect engenders improved professionalism.

> *I am supposedly "educated" and therefore aware. One memorable occasion was an internal job interview where as soon as education / continuing professional development was discussed, the process*

> *seemed to move to level 2 automatically - it is incidents such as this which make you realise the clout that this course carries. (A7)*

Networking reappeared but did not affect everyone in the same way. One NRG raised the subject at the end of the interview because she 'didn't' (G5) do it. She knew that networking was 'pushed at the beginning' but on reflection was not sure whether she 'gained or lost; probably lost, but I didn't do it.' (G5). She had networked 'at the beginning' but found that she 'needed some space'. She was not an engineer, but her attitude suggested it could be a gender issue. Gender was not something anyone else raised, but G5 continued 'most of the women don't network; except for the ladettes, and a lot of the older men'. As an NRG she might have felt excluded from some conversations, which could alter her perception of networking.

Familiarity with different business functions, and 'how the company relates...just from a bigger picture and how my role interacts with others' held more weight with A12 than his 'level of professionalism'. For him, relationships with others were affected by the course to a greater extent than his professionalism was. The MSc. gave him the ability 'to work with people with other skill sets to make the team work' (A12). His intention is to 'use this understanding to develop his team more effectively'. This idea can be linked to increased professionalism from the perspective of greater autonomy (Helsby 1996).

Becoming aware of other people and businesses, together with their associated issues reinforces the theme of broader horizons. This sits well with the 'cross industry perspective that you get from the modules' (G3). He adjudged the course would have been a 'very very different course if it had just been [company] people' and that one of the main benefits was networking with 'people from the car or textile industry'. He observed that he learned 'something completely different' and that there 'are common bits and ways you can learn from them. You can't put a value on that' (G3).

7.4.2 Rear-view Mirror

After passing nine modules, G10 found it 'difficult to summon up the drive to complete' the remaining three. 'Then there was the huge relief of finishing the taught element of the course', knowing he had passed it. Suddenly there was 'another mountain to climb' alongside increased pressure of work. Eventually he did 'reach the top of the hill – and for the first time [he] could see light at the end of the tunnel' (G10).

> *Would I do it again? Would I recommend it? – Absolutely! It is a pain to do, but the benefits can be virtually immediate. Anyone who participates and claims to have seen no career progression is probably working for a one-man business! (A7)*

> *I do believe the MSc. was well worthwhile. It is incredibly difficult, - fitting it in with the rest of your life e.g. time management. I'm very glad I've done it. (G3)*

G10 adjudged the course worthwhile, and said he would recommend it to others with the caveat 'only if I believed the individual would be able to cope'. This is a positive

recommendation for MFG since the course is designed to ensure that once participants attend Fundamentals it is very unusual for them to fail to complete the programme (PMIP). It also confirms the benefit of company participation.

7.4.3 Moving Off

All the education undertaken during the MSc. achieves nothing if participants do not build on it. It requires application at work, increased professional status leading to promotion or possibly a career move. To do this, delegates will need a certain level of confidence, (momentum) and some tools and techniques (Lave 1988) with which to apply the changes.

No respondent made a step change in his or her original circle of friends from attending the course, but several mentioned greater stature among their peers. G7 considered his main change to be an ability to communicate at 'different levels, and [in] different disciplines'.

> *I do think people tend to admire you. (A1)*
>
> *I have ended up with enough awareness to be able to talk to the techies and to the sales reps and be one step ahead of the sales reps, and one step behind the techies (G1)*
>
> *Participation in the course seems to have altered some peoples' attitudes towards me - particularly the ones that I have known for a while... amazement when they realise. (A7)*

Peer perception for G9 was a major change that came 'from outside rather than within' (G9). He based this on the 'perceived wisdom that becomes associated with successfully completing the course - by other people'. Increased stature also increases confidence.

G3 felt strongly enough to devise a strategy to ensure she did not 'lose this sort of learning' particularly after the 'frustration of going back to the job that [she] has been doing and not being able to change things' (G3). The course had given her enough confidence to try to move out of her existing circle into a new one, something she achieved subsequently.

G10 identified his new found confidence with his ability to 'talk and act with authority on most business related topics'. This extended to his proficiency to 'converse at the most senior levels within [his company] and be respected for [his] opinions' (G10). Much of his confidence came 'after the dissertation' rather than at the end of the module stage suggesting there is a continuum whereby not everyone achieves a critical level of confidence at the same stage in the programme. G6 credited his change directly to being 'more professional' and to using 'new knowledge and tools to raise [his] profile with his employer, leading to new responsibilities'. The result was a sea change in responsibilities from 'an Engineering role into Business Development' (G6).

This section has reviewed the different perspectives participants have on their ongoing professional development. The majority concluded that they were more professional in their stance, mainly as a result of the MSc. programme. Occasionally there were glimpses of slight resentment that they might not already have been professional. Chapter 3 demonstrated professionalism needs to be a continuing process. MFG offers the skills needed to maintain the momentum towards this goal.

7.5 Summary

This chapter has reaffirmed several recurring themes. The broader horizon so many students were seeking emerges as cognition of how businesses operate. Armed with this knowledge delegates are better able to make valid decisions resulting in better managers who are perceived to be more professional. Networking is an ongoing benefit for most delegates, with the suggestion that a mutual support system may develop outside the formal modular activity. It is not something that can be delineated from other activities because it pervades the entire course and is not seen as a separate 'tool or technique'. PMAs provide a valid way of embedding the learning for most but not all students. Successful time management skills improve managers' capabilities in many ways, not least the ability to sort the wheat from the chaff, resulting in better decisions.

CHAPTER EIGHT

8 Conclusions: Engineering Our Profession

A bend in the road is not the end of the road unless you fail to make the turn. *(Anon., Picture Caption, Ranmoor Hall, Sheffield)*

This final chapter will reiterate the purpose of this thesis and assess the extent to which it has identified broader external educational issues that others might choose to follow. I started from a number of key questions. My primary focus was to consider the nature of critical occasions and assess their impact on the development of engineers. To do this I examined how individuals perceive such critical episodes in relation to the nature of cognition and established how learning is embedded in post-graduate students

MFG aims to generate individual change agents (DIP 2002) capable of maximising business opportunities for their employer. Once learning has been absorbed and can be applied my opinion is that this would create such change agents. Periods of maximum change occur at times of stress or 'inflection points' (Hamel 2000). I wondered if these points of tension could be related to critical incidents described by others (see for example Flanagan, Tripp and Woods).

I identified an area in previous research where there appeared to be disparity in terminology and approach, and I sought to establish if there was indeed a difference between critical incidents and critical events. To do this I based my evidence on the personal stories of some MSc. students. The outcome of my research suggests there may be a difference between critical incidents and critical events, and that the range of responses from interviewees offer certain dominant patterns. Its contribution to educational knowledge provides an insight into a community the structure of which is unique.

In a departure from previous studies, the conclusions drawn are student centred, focussed on a single cohort taking one course over an academic year. How appropriate it is to offer generalisations based on my research that might be applicable to other courses or students is debateable. Alasuutari writes that qualitative methods are well suited to pilot studies from which a hypothesis can be created for subsequent 'testing and corroboration...so that results can be presented with better generalisability' (1995:145). My own recommendations are based on my interpretation of the testimonies offered, and I appreciate there may be other conclusions to be drawn.

No two cultures are identical, and the MFG community is unique, but there seems to be little reason why this research could not make a claim for relatability. Taking one stance, the singularity of MFG is clearly bounded, but making a claim for generalisability based on one case is to risk rejection. For this reason I chose to adopt fuzzy logic as a way of reaching some middle ground and therefore I propound that this research offers a basis for future studies elsewhere in the educational community.

I propose that the conclusions I make may apply to other students and small communities taking similar courses elsewhere. Personal circumstances, such as course structure, culture and group dynamics may well be different (Brown and Duguid 2000), but because this study is student centred I see no reason why the range of individuals studied cannot be broader than my participants. I summarise my conclusions with the conviction that others may be able to relate some or all of them to their particular circumstances.

The participants in this research 'are not special' (A12), rather they are exemplars of individuals taking courses elsewhere and they may not be distinctive. The contribution this research makes to educational knowledge, at the very least, is significant because of the objectives achieved.

The research provides evidence of types of critical occasion participants have faced during the course. It provides an insight into a particular community of students facing the challenge of completing an MSc. in an unusual environment. As such it is a case study that can be repeated in other situations. The explication of the way students learn is a further indication of the significance of this research as a whole.

The study is a micro-study with interesting connotations in its links to broader business and social issues. MFG adopted many of the ideals of Finniston relating to the teaching model (1980:167) and as such has proved successful at integrating business, academic and industrial fields into the educational experience. This exemplary course is replicable by other establishments. Finally, it has provided an accessible way of understanding how these respondents have increased their professional standing as a result of taking the programme.

8.1 The Context of Critical Issues

Wanting to understand how cognition developed in students, I wondered if there was one specific factor that helped embed the learning. This led me to examine what critical issues might influence the learning process. Leading texts relating to critical events and critical incidents include Tripp's (1993) Critical Incidents in Teaching, where specific occasions are analysed to identify lessons that can be learned from each example. Tripp achieved this by reflection, either by the author or the originator, identifying what made it critical. An alternative viewpoint is posed by Woods (1993) Critical Events in Teaching and Learning. Woods applied the notion that critical events are bigger occurrences that are in themselves significant either for the teacher or the student.

Previous research surrounding critical occasions embraces other terms including: moments, phases and reflection. Each of these expressions was located within the contextual framework to offer different standpoints in relation to the episodes described by my participants. Perry's research (1997) used CIT to encourage student nurses to develop reflective practice and appears relevant to my research because cognitive processes suggest that reflection is necessary (Brookfield 1987) for learning to occur. Some of my respondents referred to the need for reflection (e.g. G7, A8), which would support this view.

Thomson et al.'s (2002) critical moments related to times of 'biographical change'. For my study these junior managers are undoubtedly in such a situation. Their work environment is constantly shifting and probably their personal lives as well, thus making critical moments a valid criterion to examine. Sikes, Measor and Woods' (1985) critical phases are the longest in terms of timescale and could be matched to the length of the MSc. Critical reflections (see for example Halpern and Mezirow) like critical insights; symbolize mental processes rather than a firmly bounded happening. However, critical reflection is a vital part of the learning process and therefore is relevant to this study.

To identify how learning was embedded in the participants the way in which people learn was evaluated. This led to me identifying that critical thinking was a key element in the process. Critical thinking (Chaffee 1996) occurs when individuals reflect on specific happenings, and is a crucial part of how learning is established. Therefore without reflection, critical occasions might not be identified as significant by the individual, and vital learning may be lost.

Finally the impact of these critical occasions was positioned within a discussion surrounding professions, professional and professionalism. To do this the range of descriptors framing these contested terms was reviewed and related to the study group. Alongside this methods of completing PMAs were appraised as well as an ongoing review of participant standpoints.

Opportunities to examine these different perspectives resulted in my choosing to research in my own vibrant university. The course selected was Masters' level making access to individuals relatively straightforward. The group selected was a mix of Graduates and Apprentices who were interviewed and their resulting testimony analysed. Categorizing the group as Apprentices and Graduates has been useful and meaningful. The data were scrutinised for difference of attitude between Graduates and Apprentices, different types of critical occasion were identified and the resulting effect on professional development was examined.

By interviewing this cohort of students it was clear they could identify with my description of critical episodes during their programme. What was then needed was a way of evaluating the information offered by delegates. I chose to match their stories with the existing literature. Additionally a focus group was formed after the initial interviews to provide an alternative viewpoint on the range of critical occasions. All the resulting interviews were analysed to identify critical issues and their impact on professional development.

8.2 Critical Outcomes

Initial questioning revealed differences between Apprentices and Graduates in their stance towards higher education and the opportunities it offered. Apprentices were generally appreciative of the chance to study at Midshire. Graduates seemed slightly more aware of the wider opportunities on offer, and had expectations of their employers that were not apparent with the Apprentices. Over time the course seems to have

reduced the differences between the two groups and yet disparities still come through on occasion. It may be that extraneous factors of which I am not aware have influenced this divergence, but attitudinal differentiation towards PMAs suggest that the programme has been a significant influence in their formation.

Interview discussion took place around choice of modules and again differences became evident. Graduates, on the whole, had a more selfish approach to module choice, sometimes opting for modules that might be more use to them personally, or for future benefit. Apprentices were keen to exploit fresh horizons and try new ideas. This may have been because of their early training or occasionally because they had a sense of inferiority.

Mobility and risk taking are helpful attributes for individual change agents. Attitudes and communication skills between the two subsets began to merge after the initial stages of the interviews. Increasing confidence is one indicator of greater ability to take risks, and this attribute was apparent from an early stage. This is epitomised by: 'What is the worst that can happen? We can return to the status quo' (G4). Introducing change in the workplace can be expensive for a business if the wrong decision is made, so confidence is an essential ingredient. Change is often resisted by individuals, to have the confidence to suggest a transformation demonstrates maturity and reliance on skills that may well have derived from the MSc.

Outcomes recognized early in the research included ascertaining two dimensions of one specific issue. First, for an employer, there are clear benefits in sending more than one individual on the course at the same time. One advantage is that sending multiples generates a nucleus of individuals who can relate to each other in the workplace, using their newly acquired knowledge and skills for maximum company benefit. Additionally, having more than one person facilitates convincing their colleagues of possible improvements. So, multiple participants create a benefit for the business greater than if the students attended MFG separately. Another noticeable advantage identified at this stage, which was confirmed and developed in later chapters, was networking. This operated in different communities: within MFG, and within and between companies by participants once back at work. This is an important element in perceived course benefits.

The central part of the interviews discussed in Chapter 6 generated anecdotes about individual critical occasions. Once these were analysed, the occurrence of critical episodes was tracked. A normal distribution with a slightly positive skew emerged, with the majority of occasions grouped round three critical types: incidents, events and phases. These results are dependent on participants' interpretation of my original description of critical incidents and critical events and so may not be dependable. The interpretation of where these anecdotes appeared in my list of critical categories is my own, and is therefore subjective. I suggest that my results are sufficiently consistent to offer a sound level of reliability. Another stance is that they provide a sufficient base for others to develop this research further, using different courses, different types of student and different institutions.

The classification into these three main categories was not unexpected. Previous investigations suggested that critical incidents and events would be the most likely outcome. It is interesting that critical phases also created several responses. This may have been because the course has unmistakable boundaries and the mindset of respondents may have subconsciously considered these parameters. Therefore I would suggest that this is another area for further study, either within the existing course to establish if course confines were an influence, or to identify if critical phases are as significant as my data implies.

Another interesting result is that Apprentices generated 1.4 'occasions' each, while the Graduates offered 1.8. It could be argued that the different initial educational backgrounds of the two groups might account for the greater number of critical occasions described by the Graduates. I have no evidence to support this. The focus group offered one each, but that may have been a result of group expectations, and may not be significant. Identification of critical instances is not a precise science. What was critical for one person may not have been for another. The variation may be due to the diverse backgrounds of the students. This seems unlikely due to the convergence of language between the two groups during the course. Therefore this suggests another opportunity for further research.

In chapter 3 I discussed different ways of learning, (e.g. Kolb 1984, Lave and Wenger 1991, Knapper and Cropley 2000), and different ways of thinking (e.g. Chaffee 1996, Halpern 1996). What emerged from the data analysis was that cognition occurred throughout the course. It seemed that the range of teaching methods adopted suited most individuals at various stages in the course. Several respondents cited tools and techniques gained from the course as providing a lever for their ongoing development. Some participants were aware that the brain functions at different levels (A12, G8) and were actively trying to harness that skill to achieve greater cognition.

Chapter 7 reviewed the impact of PMAs on the cognition of students, and considered how attitudes and professionalism developed during the course. Two main approaches to PMAs were adopted, applying PMAs to work based problems or not applying them. Students derived benefit from both methods with a higher proportion of Apprentices choosing the work-based route. Once again networking was cited as an added benefit that happened both at work and MFG. Networking is something people have to work at to gain benefit. Belonging to a group does not always come naturally and those who need to put in more effort to join a group gain the most (Siegel and Siegel 1957).

The professionalism of the group came though strongly as an advantage of taking the MSc, with the group developing their own professional formation during the modules. Professional development was encouraged by syndicate work and case studies used during the course to embed the learning. One way this happens is by the requirement to present syndicate findings back to the rest of the module with the ensuing discussion and debate. It encourages participants to reflect on their thinking and making presentations increases their confidence.

Individuals increased their standing both within and outside their community as a result of the skills acquired. One demonstrable outcome from this research is how these particular engineers used the course to assert their professional standing, within both their working community and also their personal lives. The range of skills acquired by a student taking this MSc. implies they have developed the expert knowledge, skill and experience necessary to become professionals. Merely acquiring the ability does not immediately create a professional, but using the competences gained from the interpersonal modules equips the students to meet the needs of their clients and so encourages professionalism.

8.3 Critical Reflection

Critical thinking leads to change (Chaffee, Brookfield, and Pillay). To think critically it is necessary to have learned something which can be deliberated mentally. The process of thinking involves making connections and if the arena in which these connections are being made is new to the individual, then learning occurs. Making new connections and subsequently acting on them may bring about change. The process of identifying new connections requires reflection. Without knowledge there can be no possibility of making new connections.

Reflection has been mentioned throughout this research. Reflection was necessary for identification of the critical occasions described by participants. The critical occasions might have remained buried in participants' memories without my prompting, thus they cannot happen without some form of contemplation. Each of the critical occasions identified by these participants was peculiar to its originator and located in their memory (Rosen1998).

In my opinion, to be a professional it is necessary to be reflective. Without this skill, people are unable to respond to situations as they unfold. The result might be that benefit to the client is not maximised, which suggests an unprofessional approach. Tripp's approach to analysing critical incidents was to examine a past happening and identify what made it critical. I would contend that what was happening with Tripp's examples was critical reflection. It was the reflection that made it critical, not the incident itself.

This MSc. is a unique mix of academic theory supported by related practice. Yet MFG offers education, not training. This important distinction is summed up well by Rudduck:

> *My teacher training course had provided me with the basics, but the basics are never enough: the training failed to equip me with ways of looking at and thinking about the events and interactions of the classroom as a basis for the improvement of my art as a teacher. (1991:18)*

The point here is that training and education are greatly improved if an individual understands the importance of reflection. For reserved engineers reflection may not

come naturally, but the interactive process undergone at MFG encourages such contemplation. Integrated education, as recommended by Finniston (1980:107) and offered by MFG, imparts off the job education that may provide a better opportunity for individuals to become change agents.

> *We have many managers who have completed Diplomas, MBAs and other qualifications and still display the most appalling behaviours as managers.* (G8)

There is an implication here that some management education results in the individual returning to work unchanged and uncooperative. MFG equips its students with the tools to implement change and the confidence to feel further learning is possible.

I contend that MFG offers students an opportunity to build professional skills that equip them for their professional life ahead. It proffers vistas that may become reality for participants at sometime in their future working lives and gives them the confidence to handle change in many different ways. MFG does this by encouraging reflection throughout most modules. Reynolds (1998) suggests management education has not adopted critical reflection – I would contend that MFG does so implicitly. At the levels of complexity at which industry now operates, intuitive decisions are unwise. Reflecting on a decision increases the probability that a more reliable decision is made. Without reflection change will not occur.

Finally I have mentioned myself on occasion throughout this exploration. It is time to reflect on how I too have changed. I started my EdD. as a positivist with very clear cut ideas. I have found the research a challenge from this perspective. One good example of how my stance has altered is my perception of 'professional', having come from one of the traditional professions my awareness of wider and deeper issues has increased immensely. I had a larger scale notion of research design until I focused on the more manageable. In doing so this has given me more purchase on the experience and the ethos of the programme as a social community than before. This has led me to problematise issues which I had taken for granted earlier.

8.4 Summary of Key Arguments, Empirical Findings and Implications for Further Study

This section details the main arguments of the thesis, reviews the empirical findings and finally the implications for further study are appraised from the perspective of different interested audiences.

8.4.1 Key Arguments

My central aim was to identify a framework of critical episodes from a study group of engineers taking a Masters course on which future work could be based. This investigation expands the boundaries of critical incident research by drawing on previous studies into critical events to codify them. I investigated the classification to

appreciate how learning was embedded in the engineers and to assess the influence this had on their professional formation.

Critical occasions have been used extensively in different fields of research in dissimilar ways. This study highlighted an area in previous narratives that had ambiguities, both in terminology and application. My purpose was to draw on these disparate areas to demonstrate that there are commonalities of CI's within the field of education.

Differing from some earlier studies I used participants' voices to examine how their critical episodes contributed to individual educational development by discussing the role of cognition and professional development in this process. My respondents reflected on their experiences during the taught element of the MSc. Something they found 'difficult' (G7) on occasion.

I encouraged participants to reveal their CI's by giving them descriptions of critical events (Tripp 1993, Woods 1993) a few days prior to interview. This offered them a model, gave early momentum to their thoughts, and initiated a rapport between us. Many of these reflections belong to participant voices offering strong evidence to support my claim.

Another aspect of this research considered the effect of CI's upon attitudinal differences between the two groups of students, Apprentices and Graduates. I hoped to identify differences in their approach to education. The developing professional identity of respondents is another area examined in the research. Using the proffered critical events the study provides an insight into how and why such professional development occurs in these engineers.

The impact of memory and cognition on how the learning was embedded was also examined and its significance on how confidence developed through completing PMA's was evaluated. This investigation puts forward evidence regarding how and why professional development happens during an MSc. It does not suggest that these events only occur at MFG, but rather that there is an element of commonality of CI's that may happen elsewhere.

8.4.2 Empirical Findings

I found the examples presented by interviewees enhanced and developed my initial taxonomy of critical episodes and accorded with the range of CI's previously described. Earlier writing suggests ways in which such critical occasions (Knapper and Cropley 2000) can be facilitated in the classroom and was supported by my research. By promoting interaction (Rudduck 1978) the value of the educational experience was improved for participants. The investigation provides an indication of how people learn using critical reflective thinking.

From this research learners can appreciate the implications for them of milestones during their studies. Critical occasions can happen at any time, and have diverse structures, ranging from a 'brief moment in time' (Thomson et al. 2002) through to a critical phase that might span several years (Sikes, Measor and Woods 1985). An

understanding that such episodes arise, sometimes at times of tension (Hamel 2000), may facilitate the cognition process and increase confidence.

The study revealed attitudinal changes within the subsets of Apprentices and Graduates. Approaches appeared to converge as the course progressed. Additionally I found in discussions with respondents that their incidents resulted in greater cognition and increased confidence leading to professional formation.

Well founded knowledge enhances opportunities for networking and was another finding of this study. Association with fellow participants and like minded colleagues maintains the momentum from the course and reminds participants of past learning experiences. The process of contacting another delegate with a work related problem might offer an immediate solution or it could induce critical thinking by initiator or recipient. Reflecting may enable the novice to articulate issues that s/he otherwise might not have done.

Several respondents mentioned the benefit of having like minded colleagues back in the workplace. I established that by sending several participants at once employers benefit more than from sending students in succession. One unexpected outcome involved two students who changed employers during the course. I found that each had continued on the programme against the wishes of their new employer. MFG should consider offering additional support to delegates who change posts and exploit this potential opportunity to recruit new companies to the scheme.

8.4.3 Implications for Further Study

There are distinctive communities that might draw lessons and issues from this research: practitioners, learners and the academy. This section will assess the implications for future study for each of these audiences.

Practitioners

Practitioners may be able encourage learners during the early stages of their course knowing that change should occur. Benefits include increased cognition for learners and improved professional practice and self-assurance for the tutor. Interaction promotes critical thinking (Brookfield 1987). This knowledge should encourage other professionals to increase these skills to advance their own and their students' understanding, which in turn encourages reflection. Further research could be conducted to identify ways of generating more opportunities for this to occur.

Learners

Knowledge that the brain works on different levels can be useful to learners. There may be occasions while studying when the volume of information being put forward leaves the recipient feeling overwhelmed (G4). Awareness that the brain continues processing this information should reduce the sense of vulnerability (A2) sometimes felt when in

class. Also, timely awareness of the benefits of completing relevant PMA's could augment professional development.

Networking has been a consistent theme throughout this study and it leads to greater confidence and professional formation. Students can be reassured that interaction provides an added dimension to the quality of the educational experience. Those delegates who 'didn't do it' (G5) should be aware that they will gain more from networking (Siegel and Siegel 1957) than those for whom interaction comes easily.

One desired outcome of this MSc. is to create students with an ability to act as change agents. During the life of the MSc. most delegates described acquiring a 'toolbox' of models and techniques to use in different situations. This suggests that for participants beginning this MSc. they can begin the course knowing their skills should strengthen while they are a student.

The Academy

The importance of this study for future research is that the CI framework provides a scaffold on which future research could be built. The classification is my interpretation of events, there will be others, offering opportunities for further study. It suggests that using student-centred data is legitimate and offers compelling evidence for encouraging students to reflect on their own erudition to maximise learning opportunities.

This research was based in my own institution and as such could be replicable elsewhere with other learners at different levels. I make no great claim for generalisability, but by repeating this research elsewhere the reliability of my data could be corroborated. I identified a simple classification of critical occasions (p.102) that occurred to one group of students during one course. Using semi-structured interviews I established a base line for my taxonomy. Alternative methodologies could be utilised to support and build on this research.

Attitudinal differences identified by this research offer opportunities for additional work. There may be a link between the nature of the CI and individual attitudes that is not apparent in a small scale study of this kind. Future investigations could utilise the curves (Bass and Vaughan 1966) of attitude, knowledge and enthusiasm depicted by A6 (p.121). The implications for me of this research both as a practitioner and also a learner are worth recording here.

As a practitioner it was comforting to know that some things I was doing intuitively, such as interaction, are underpinned by sound academic theory. I will endeavour to increase the amount of interaction and networking opportunities in my teaching, but with a sense of proportion so my students are not overwhelmed.

For me this research project has at times been a trial. I have learned how research should be done and that my plans have sometimes been too ambitious. I have consciously altered my strategy whilst writing up this thesis. I now recognize when my brain is in tumult and try and deflect my thoughts to other issues in the knowledge that

when I return to the original topic my subconscious mind will have been making connections that at first I could not see. I know that time is needed to absorb, digest and connect seemingly unfamiliar linkages. I hope that this thesis is the better for just that opportunity to reflect.

It may well be that if I were starting this research now the conclusions might be different. Manufacturing output in the UK is still declining. There are now more hairdressing apprentices[1] than engineering ones in the Midlands. In the early years of the 21st century we are already far removed from the Finniston report which influenced the development of this course nearly twenty-five years ago. In the future the impact of the constantly changing social, political and economic context may well affect the position and character of the course. MFG is changing but so too are the students. MFG must be ever vigilant of its own inflection points for 'the times they are a-changin' (Dylan 1964).

[1] BBC Midland News June 2003

Appendix 1 Interview Questions

1. Can you tell me your background education and working life prior to starting your MSc?
   - When did you start your MSc., and
   - Why do you think your employers selected you?
   - Can you describe the nature of your current position?
     - Has this changed since you began the MSc?

2. You are 'allowed' some module choice on the MSc. programme. Can you explain / justify your choice of modules?
   - Was it driven by any particular needs / logic / knowledge gaps / ease of completion or anything else with which you can identify formally?
   - On reflection was your module choice the correct one, and if not can you explain what you would have chosen instead, and why?
   - Was there anything which was particularly good or bad / useful not useful / anything which has not been useful yet but that you expect might be in the future?
   - If you had this time over again which one(s) do you think you might have done differently, and why?

3. Can you now identify if there was one critical incident which helped to embed the learning from your MSc. or one which helped you to see that by undertaking a particular activity or action you could or would achieve the end result or realise the potential of completing your MSc.
   - The issue could be related to relevance of the module choice / course as a whole
   - Or to something which was useful / not useful
   - Or to something related to your professional role / identity
   - Did this critical incident have any relationship to factors that were not directly dependent on the course?
   - Careful to ensure commonality of what a critical incident might be

4. Has your attitude to the course changed during your three years?
   - i.e. Did you embark on the MSc. with great enthusiasm, or
   - go through one (or many) phases of frustration / despair
   - Before (if ever) you reached / realised that the course was worthwhile?

5. When you started on the MSc. can you remember if you had any 'expectations' relating to how you might assimilate the knowledge imparted to you?
   - Has this view changed over time?
   - Has your ability to assimilate knowledge developed over the life of the course?
   - If so, how and why?
   - Did your attitude to the PMA change during the MSc. e.g. Did you use the PMA as a 'tool' to benefit your work / dissertation, and if so do you think the usefulness of the PMA was enhanced by so doing?

6. In what ways do you think the MSc. has changed you – attitudes, awareness, professionalism, working practices, or any other facets? Did any 'critical incidents' have any bearing on this? Could you identify the extent to which the MSc. has contributed to your development as an individual
    - Depending on response – range of alternative sub - questions
        - Has it influenced your occupation of your peer group
        - (either in a module grouping,
        - or a workplace group, or,
        - perhaps any social grouping)
    - If the answers is 'very little'
        - further questions on if it didn't influence your development, why did it have little impact, and,
        - What have been the major influences on your development as an individual, and as a team member?

7. Is there any area that you feel has not been covered by the questions asked so far, or is there anything that you would like to say relating to those things that have been covered, or any other area?

Check:

If can check with 'boss' / industrial supervisor if need be

BP & SM module runnings:

18 - 22 09 00

4 - 8 12 00

26 - 30 03 01

25 - 29 06 01

Appendix 2 Request for Participants

Guinea Pigs Needed!

For those of you who don't know me, I have been with MFG for over two years, and I am now involved in an MFG project for which I require your help.

I started my working life with a BSc in Geography, spending ten years in industry where I qualified as an accountant. Prior to joining 'Midshire' I spent twenty years in education teaching a variety of undergraduate and post-graduate courses, as well as teaching students for the professional accountancy exams. During this time I completed an MBA, here at Midshire and I am currently working on a Thesis for my 'Doctor of Education' at Sheffield

Hence the request for help!

The working title of my Thesis is:

'How does WMG make delegates aware of the benefits gained from the MSc. programme at the time of delivery rather than retrospective awareness?'

How can you help?

Initially I need to interview you regarding your experiences during the course. These interviews should last approximately 30 – 40 minutes and I would wish to record them! I should stress that the recording is for my own benefit, I don't take shorthand, and my writing is atrocious!

All the information given to me will be treated as confidential, and if included in my thesis will be anonymous. The interviews could be arranged here, or at work, or some mutually convenient meeting place. The time-scale is probably in the next three months.

My email is: ann.butchers@'midshire'.ac.uk

Tel 572672

Thank you in advance for your co-operation!

Ann Butchers

Appendix 2 Request for Participants Cont.d

BP & SM –Plus date of module running as appropriate

MFG Project – re embedding knowledge.

Name

Contact Address

Telephone

Email

Academic Supervisor

Industrial supervisor

Appendix 3 *Participant Details*

Identity Code	Interview Date	Company Type	Age	Qualifications			
				Apprent.	HNC/D	Degree	Other
A1	14.12.00	Auto Coy.	36	Mech.			DMS
G1	8.1. 01	Aero Coy.	30			B.Eng.	
A2	23.1. 01	Aero Coy.	30	Appr.	HND		CIPS,IMDS
G2	24.1 .01	Auto Coy.	29			B.Eng (Mech).	
G3	25.1. 01	Aero Coy.	29			B.Eng	
A3	11.4. 01	Auto Coy.	35	Technical Appr.	O & HNC	B.Eng.	C & G
A4	2.5. 01	Auto Coy.	50	Appr.			C & G, IMLP& I Eng.
G4	5.5. 01	Gen. Eng.Coy.	34			B.Eng	
A5 (T)	5.5. 01	Auto Coy.	31	Appr.	BTEC Eng.	B.Eng (Ist)	
G5 (T)	25.5. 01	Auto Related Coy.	41			BSc. (Sports Science)	PGCE, Leisure Man.ment qual.n.
A6 (written)	Sept. 01	Aero Coy.	32		O & HNC	B.Eng	Teach. Qual.
G6	Oct. 01	Aero Coy.	41			BSc.	Chtd.Eng
G7	15.10. 01	Gen. Eng.Coy	43			B.Eng (Mech)	
A7	22.10. 01	Auto Coy.	40	Appr.	HND		IEng
A8	21.10. 01	Aero Coy.	34	Elec.Appr.	2xHNC		APICS
G8	23.10. 01	Aero Coy.	32	Systems Analyst		BSc. (Econ)	
G9	26.10. 01	Auto Related Coy.	42			BSc. (Polymers)	
G10	28.10. 01	Aero Coy.	29		HNC	B.Eng (Mech)	
A9 (T)	1.11. 01	Auto Related Coy.	49	Appr.		Lic.d Eng.	IMDS
A10 (T)	28.10. 01	Auto Related Coy.	40	Appr.			
A11 (T)	1.11. 01	Aero Coy.	35	Appr.			
A21 (T)	25.5. 01	Auto Related Coy.	37		HNC		
A22 (T)	5.5. 01	Auto Related Coy.	41				Navy
A12 (T)	25.5. 01	Auto Related Coy.	36	Appr.			
Average Age			**36.5**	**Apprentices**	**37**	**Graduates**	**35**

Note:

The information is as complete as possible based on details provided during the interviews. Some of this information was not 'required' for my interviews but emerged during the conversations. (T) – Represents those interviews that were used direct from the tape.

Participant Details Cont.d

Identity Code	Sponsored	Job/Indy Change	Job Details		Changes ?Why	Sent or Fought	Small Coy.exp
			Then	Now			
A1		Yes/ Yes	Prod.n	General Assembley		Sent	Yes
G1	Yes	No			4 job changes		No
A2		No				Fought	No
G2	Yes	No			2 x Promotion		No
G3	Yes	No			Same job since joining		No
A3		Yes / Yes		Manufacturing Director			Yes
A4		No					No
G4		Yes / Yes		Quality Manager			No
A5 (T)		Yes / YES		Shift Supervisor			No
G5 (T)		Yes / Yes		Production Manager		Fought	No
A6 (written)		Yes / Yes		Site Manager		Fought	Yes
G6	Yes	Yes / Yes	MoD	Risk/Bus. Dev		Fought	Yes
G7	Yes	Yes / No				Sent	No
A7		Yes / Yes					No
A8		No	Man. Eng.r	Production Manager	2 x Promotion	Competitive entry	No
G8		No					No
G9	Yes	Yes / No					No
G10		Yes / Yes					Yes
A9 (T)		No		Director of subsidiary			No
A10 (T)		Yes / Yes		Manufacturing Director			Yes
A11 (T)		No				Fought	No
A21 (T)				Quality Manager		Fought	Yes
A22 (T)				Logisitics Manager		Sent	No
A12 (T)						Fought	

Summary Details	Apprentices	Graduates	Total
Automotive Industry	5	1	6
Auto.Related Industry	5	2	7
Aero. Industry	4	5	9
Gen Engineering	0	2	2
Total	14	10	24

Glossary of Terms

This provides information about business terms used in this thesis that may not be commonly used terminology in the field of education.

CIP	Continuous Improvement Programme
Kaizen	A Japanese manufacturing technique
Six Sigma	A Quality management technique
Taguchi	A Japanese manufacturing technique

Interviews with Staff Members

Academic Director of Graduate Studies: 12th September 2000

Director of Industrial Programmes: 6th June 2002

Programme Manager Industrial Programmes: 19th December 2002

Primary Source Documents

(Consulted at Midshire)

Bhattacharyya, K (1993) 'Change management in the Automotive Industry' Address to the British Association for the Advancement of Science and Engineering, Keele 31.8.1993

Lawrence, R. & Reynolds, C. (1988) Paper presented to the SME Task Force Commission of the European Communities 13 June 1988.

Midshire (1980) Faculty of Science Minute 7 / 80. This provided information about establishing MFG as a Centre of Manufacturing

Midshire (2002a) www.midshire.ac.uk/about/history.html [1.11.2002] offering facts about the early development of Midshire

Midshire (2002b) www.midshire.ac.uk/about/profile/size.html [1.11.2002] revised March 2002. Provided recent facts about the student numbers.

Midshire (2002c) www.midshire.ac.uk/about/profile/finance.html [1.11.2002]. Revised May 23. 2002. Source of information concerning different types of revenue stream.

Midshire (2002d) www.mgf.midshire.ac.uk/contprofdevpage.html [30.08.2002]. Confirmation of the professional bodies from which exemption can be obtained through completing MFG courses.

Midshire (2002e) MFG Prospectus

Midshire (2002f) www.mfg.midshire.ac.uk/postgradpage.html [30.08.2002]. Provides details about the range of Degrees MFG is currently offering.

Reynolds, C (1993) 'Achieving World Class Performance- The Capability Gap', Article submitted to Logistics International Jan 1993.

Reynolds, C. (1994) 'The Capability Gap', Journal of Automotive Engineering, 1994

Reynolds, C. (1996) Presentation to the 3rd Education and Training Forum of the Institute of Logistics. 11.6.1996.

Bibliography

A.C.C.A. (2003) ACCA Rulebook 2003, London: The Association of Chartered Certified Accountants.

Alasuutari, P. (1995) Researching Culture: Qualitative Method and Cultural Studies, London: Sage.

Allies, L. (2000) Governor's Lives: A Study Of School Governors During Their Terms Of Office, EdD. Thesis, University of Sheffield.

Allport, G. (1954) 'Attitudes in the History of Social Psychology', Reprinted in Jahoda, M. and Warren, N. (eds), (1966) Attitudes: Selected Readings, Harmondsworth: Penguin, pp. 15 -21.

Altheide, D. and Johnson, J. (1994) 'Criteria For Assessing Interpretive Validity In Qualitative Research', in Denzin, N. and Lincoln, Y. (eds), Handbook of Qualitative Research, Thousand Oaks, California: Sage, pp. 485 – 499.

Altrichter, H. (1993) 'The Concept Of Quality In Action Research: Giving Practitioners A Voice In Educational Research', in Schratz, M. (ed), Qualitative Voices in Educational Research, London: Falmer Press. pp. 40 – 55.

Alvesson, M. and Skoldberg, K. (2000) Reflexive Methodology: New Vistas for Qualitative Research, London: Sage.

Anderson, G., Herr, K. and Nihlen, A. (1994) Studying Your Own School: An Educator's Guide to Qualitative Practitioner Research, Thousand Oaks, California: Corwin Press.

Anderson, G. with Arsenault, N. (1998) Fundamentals of Educational Research, 2nd Edition, London: Falmer Press.

Arksey, H. and Knight, P. (1999) Interviewing For Social Scientists, London: Sage.

Astin, A. (1977) Four Critical Years: Effects of College on Beliefs, Attitudes, and Knowledge, San Francisco: Jossey-Bass.

Barlow, A. (1946) Scientific Man-Power, Reprinted 1965, London: Her Majesty's Stationery Office, Cmnd. 6824.

Baron, J. (2000) Thinking and Deciding, 3rd Edition, Cambridge: Cambridge University Press.

Bass, B. and Vaughan, J. (1966) Training in Industry: The Management of Learning, Belmont, California: Wadsworth Publishing Company.

Bassey, M. (1981) 'Pedagogic Research: On The Relative Merits Of Search For Generalisations And The Study Of Single Events', Oxford Review of Education, Vol. 7, No. 1, pp. 73 – 94.

Bassey, M. (1995) Creating Education Through Research: A Global Perspective of

Educational Research For The 21st Century, Edinburgh: British Educational Research Association.

Bassey, M. (1999) Case Study Research in Educational Settings, Buckingham: Open University Press.

Bassey, M. (2001) 'A Solution to the Problem of Generalisation in Educational Research: Fuzzy Prediction', in Oxford Review of Education, Vol. 27, No. 1, pp. 1 – 22.

Beder, S. (1998) 'A Bit of the Rain Man in Every Engineer', Engineers Australia, April 1998, pp. 57 – 58. www.uow.au/arts/sts/sbeder/columns/engcol1.html [15.7.2003].

Bell, J. (1993) Doing Your Research Project: A Guide For First-Time Researchers In Education And Social Science, 2nd Edition, Buckingham: Open University Press.

Bendix, R. (1974) 'Inequality And Social Structure: A Comparison Of Marx And Weber', American Sociological Review, Vol. 39, (April 74) pp.149 – 161.

Benn, R. (1993) 'Access Tutors Do It Without Training: An Investigation Of Professional Development Needs In Adult Education', Paper presented to the International Conference on Training and Professional Development in Adult and Continuing Education, Wadham College Oxford 13 – 15 September 1993.

Beresford, J. (1995) 'Teacher Union Perspectives on the Management of Professionals', in Busher, H. and Saran, R (eds), Managing Teachers as Professionals in Schools, London: Kogan Page, pp. 71 – 88.

Billett, S. (1996) 'Situated Learning: Bridging Sociocultural and Cognitive Theorising', Learning and Instruction, Vol. 6, No. 3, pp. 263 – 280.

Blaxter, L., Hughes, C. and Tight, M. (1996) How to Research, Buckingham: Open University Press.

Bligh, D. (1982) Professionalism and Flexibility in Learning, Guildford: The Society For Research into Higher Education.

Bloom, M. and Fischer, J. (1982) Evaluating Practice: Guidelines for the Accountable Professional, Englewood Cliffs, New Jersey: Prentice Hall.

Blowers, C. (2003) What Is Your Learning Type? Myers-Briggs Type Classification, http://blowers.chee.arizona.edu/ENGR196b/mbti/mbti.htm [15.7.2003].

Bogdan, R. and Biklen, S. (1992) Qualitative Research for Education, 2nd Edition, Needham Heights: Allyn and Bacon.

Boshier, R. (1990) 'Socio-Psychological Factors In Electronic Networking', International Journal of Lifelong Education, Vol. 8, No. 1, pp. 49 – 64.

Bottery, M. (1998) Professionals and Policy: Management Strategy in a Competitive World, London: Cassell.

Boud, D., Keogh, R. and Walker, D. (1985) 'What is Reflection in Learning?', in Boud, D., Keogh, R. and Walker, D. (eds), Reflection: Turning Experience into Practice, London: Kogan Page, pp. 7 – 18.

Boyd, E. and Fales A. (1983) 'Reflective Learning: Key To Learning From Experience', Journal of Humanistic Psychology, 1983, Vol. 23, No. 2, pp. 99 – 117.

Brause, R. (2000) Writing Your Doctoral Dissertation: Invisible Rules For Success, London: Falmer Press.

Breakwell, G., Hammond, S. and Fife-Schaw, C. (2000) Research Methods in Psychology, 2nd Edition, London: Sage.

Brookfield, S. (1987) Developing Critical Thinkers: Challenging Adults to Explore Alternative Ways of Thinking and Acting, Milton Keynes: Open University Press.

Brookfield, S. and Preskill, S. (1999) Discussion As A Way Of Teaching: Tools And Techniques For University Teachers, Buckingham: Society for Research into Higher Education and Open University Press.

Brown, J. and Duguid, P. (2000) The Social Life of Information, Boston: Harvard Business School Press.

Bruner, J., Goodnow, J. and Austin, G. (1986) A Study of Thinking, New Brunswick, New Jersey: Transaction Publishers.

Bryman, A. (1988) Quantity and Quality in Social Research, London: Routledge.

Burgess, R. (1982) Exploring Society, London: The British Sociological Society.

Burgess, R. (1984) In the Field: An Introduction to Field Research, London: Routledge.

Byers, P. and Wilcox, J. (1988) 'Focus Groups: An Alternative Method Of Gathering Qualitative Data In Communication Research', Paper presented to the Annual Meeting of the Speech Communication Association, 74th New Orleans, Los Angeles, November 3-6 1988.

Carroll, D. (1994) Psychology of Language, 2nd Edition, Belmont, California: Brooks/Cole Publishing Company.

Carr-Saunders A. and Wilson, P. (1933) The Professions, Reprinted 1964, Frank Cass, Oxford: Oxford University Press.

Carspecken, P. and MacGillivray, L. (1998) 'Raising Consciousness about Reflection, Validity, and Meaning', in Shacklock, G. and Smyth, J. (eds), Being Reflexive

in Critical Educational and Social Research, London: Falmer, pp.171 – 190.

Carswell, J. (1985) Government And The Universities In Britain: Programme And Performance 1960 - 1980, Cambridge, Cambridge University Press.

Chaffee, J. (1996) Thinking Critically, 5th Edition, Boston: Houghton Mifflin.

Clegg, S. and Hardy, C. (1996) 'Organisations, Organisation and Organising', in Clegg, S., Hardy, C. and Nord, W. (eds), Handbook of Organisation Studies, London: Sage, pp. 1 – 28.

Coffey, A. and Atkinson, P. (1996) Making Sense of Qualitative Data: Complementary Research Strategies, Thousand Oaks, California: Sage Publications.

Cohen, L. and Manion, L. (1994) Research Methods in Education, 4th Edition, London: Routledge.

Corning, W. and Ratner, S. (1967) Chemistry of learning: Invertebrate Research, New York: Plenum Press.

Crawford, M., Kydd, L. and Riches, C. (1997) Leadership and Teams in Educational Management, Buckingham: Open University Press.

Dearing, R. (1997) National Committee of Inquiry into Higher Education – "Higher Education in the Learning Society", London: Her Majesty's Stationery Office.

Delamont, S. (1992) Fieldwork in Educational Settings: Methods, Pitfalls and Perspectives, London: The Falmer Press.

Dennison, B. and Kirk, R. (1990) Do, Review, Learn, Apply: A Simple Guide to Experiential Learning, Oxford: Basil Blackwell.

Denscombe, M. (1998) The Good Research Guide: For Small-Scale Social Research Projects, Buckingham: Open University Press.

Denzin, N. (1989) Interpretive Interactionism, Newbury Park, California: Sage.

Dewey, J. (1938) Education and Experience, Reprinted 1959, New York: MacMillan: Kappa Delta Pi.

Doty, R. (1998) 'The Five Mysteries Of The Mind, And Their Consequences', Neuropsychologia, Vol. 36, Issue 10, 1st October 1998, pp. 1069 – 1076.

Duke, C. (1992) The Learning University: Towards a New Paradigm, Buckingham: SRHE and The Open University.

Duke, C. (2002) Managing The Learning University, Buckingham: SRHE and The Open University.

Dunseath, K. (1999) The Last of the Secret Gardens? Understanding the 'crisis' in

Educational Research, EdD. Thesis, University of Sheffield.

Dylan, B. (1964) The Times They are a-changin', Columbia Records

Elwell, F. (2003) Weber and Marx, www.faculty.rsu.edu/~felwell/Theorists/Weber/Whome.html. [24.6.2003].

Eraut, M. (1994) Developing Professional Knowledge and Competence, London: Falmer Press.

Eraut, M. (1995) 'Developing the Professions: Training, Quality and Accountability', in Gordon, P. (ed), The Study of Education: Inaugural Lectures Vol. 4, End of an Era, London: Woburn Press.

Eraut, M. (1999) 'The Characterisation and Development of Professional Expertise in Education Management and Teaching', in Strain, M., Dennison, B., Ouston, J. and Hall, V. (eds), Policy, Leadership and Professional Knowledge in Education, London: Paul Chapman Publishing.

Etzkowitz, E. and Leydesdorff, L. (1997) Universities and the Global Knowledge Economy: A Triple Helix of University - Industry - Government Relations, London: Cassell.

Finniston, M. (1980) Engineering Our Future "Report of the Committee of Inquiry into the Engineering Profession", London: Her Majesty's Stationery Office.

Flanagan, J. (1954) 'The Critical Incident Technique', Psychological Bulletin, Vol. 51, No. 4, pp. 327 – 358.

Flower, F. (1986) 'Towards Capability', in Burgess, T. (ed), Education For Capability, Windsor: NFER- Nelson.

Fly, B., van Bark, W., Weinman, L., Kitchener, K. and Lang, P. (1997) 'Ethical Transgressions of Psychology Graduate Students: Critical Incidents with Implications for Training', Professional Psychology: Research and Practice, Vol. 28, No. 5, pp. 492 – 495.

Fourali, C. (1997) 'Fuzzy Logic in Educational Measurement: The Case of Portfolio Assessment', Evaluation and Research in Education, Vol. 11, No. 3, pp. 129 – 148.

Frain, J. (1993) The Changing Culture of a College, London: The Falmer Press.

Fraser, W. (1995) Learning from Experience: Empowerment or Incorporation, Leicester: National Institute of Adult Continuing Education.

Freidson, E. (1984) 'The Changing Nature of Professional Control', Annual Review of Sociology, Vol. 10, pp. 1 – 20.

Freidson, E. (1986) Professional Powers, Chicago: The University of Chicago Press.

Freidson, E. (1988) Profession of Medicine: A Study of the Sociology of Applied Knowledge, Chicago: University of Chicago Press.

Freidson, E. (1993) 'How Dominant are the Professions', in Hafferty, F. and McKinlay, J. (eds), The Changing Medical Profession, Oxford: Oxford University Press, pp. 54 – 66.

Freidson, E. (1994) Professionalism Reborn: Theory, Prophecy And Policy, Cambridge: Polity Press.

Freidson, E. (2001) Professionalism: The Third Logic, Cambridge: Polity Press.

Fullan, M. (2001) Leading in a Culture of Change, San Francisco: John Wiley and Son.

Fullan, M, with Stiegelbauer, S. (1991) The New Meaning of Educational Change, 2nd Edition, London: Cassell Educational.

Geertz, C. (1973) The Interpretation of Cultures: Selected Essays, New York: Basic Books.

Ghaye, A. and Ghaye K. (1998) Teaching and Learning Through Critical Reflective Practice, London: David Fulton Publishers.

Giroux, H. and Myrsiades, K. (2001) Beyond The Corporate University: Culture And Pedagogy In The New Millennium, Lanham, Maryland: Rowman and Littlefield.

Glaser, R. (1999) 'Expert Knowledge And Processes Of Thinking', in McCormick, R. and Paechter C. (eds), Learning and Knowledge, London: Paul Chapman Publishing, pp. 88 – 102.

Glen, S. (2000) 'The Dark Side Of Purity Or The Virtues Of Double-Mindedness', in Simons, H. and Usher, R. (eds), Situated Ethics In Educational Research, London: RoutledgeFalmer, pp. 12 – 21.

Goodson, I. (1992) Studying Teachers' Lives, London: Routledge.

Goodson, I. and Sikes, P. (2001) Life History In Educational Settings, Buckingham: Open University Press.

Greenbaum, T. (2000) Moderating Focus Groups: A Practical Guide For Group Facilitation, Thousand Oaks, California: Sage.

Greeno, J., Pearson, P. and Schoenfeld, A. (1999) 'Achievement and Theories of Learning and Knowing', in McCormick, R and Paechter, (eds), Learning and Knowledge, London: Paul Chapman Publishing, pp. 136 – 153.

Gruzelier, J. (2003) 'Brain-wave Control And Music Performance Enhancement', Lecture given at Lichfield International Festival, 8.7.2003.

Halpern, D. (1996) Thought and Knowledge: An Introduction to Critical Thinking, 3rd Edition, New Jersey: Lawrence Erlbaum Associates.

Hamel, G. (2000) Leading The Revolution, Boston: Harvard Business School Press.

Hammersley, M. (1987) 'Some Notes on the Terms 'Validity' and 'Reliability', British Educational Research Journal, Vol. 13, No. 1, pp. 73 – 81.

Hargrove, E. (1972) Professional Roles in Society and Government: The English Case, Beverly Hills: Sage Publications.

Harley, T. (2001) The Psychology of Language: From Data to Theory, 2nd Edition, Hove: Psychology Press.

Harries-Jenkins, G. (1970) 'Professionals in Organizations', in Jackson, J. (ed), Professions and Professionalisation, Cambridge: Cambridge University Press, pp. 51 – 108.

Harrington, H., Quinn-Leering, K. and Hodson, L. (1996) 'Written Case Analysis and Critical Reflection', Teaching and Teacher Education, Vol. 12, No. 1, pp. 25 – 37.

Harris, J. (2000) 'Re-Visioning The Boundaries Of Learning Theory In The Assessment Of Prior Experiential Learning (APEL)', Paper presented at SCUTREA, 30th Annual Conference, July 2000, University of Nottingham.

Hart, C. (1998) Doing a Literature Review: Releasing the Social Science Research Imagination, London: Sage Publications.

Hedrick, T., Bickman, L. and Rog, D. (1993) Applied Research Design: A Practical Guide, London: Sage.

Hegarty, J. (2001) Standing The Heat: A Case Study Of Culinary Arts Curriculum Development In Higher Education, EdD. Thesis, University of Sheffield.

Helsby, G. (1996) 'Defining And Developing Professionalism In English Secondary Schools', Journal of Education for Teaching, Vol. 22, No. 2, pp. 135 – 148.

Helsby, G. (1999) Changing Teachers' Work: The 'Reform' Of Secondary Schooling, Buckingham: Open University Press.

Hill, W. (1969) Learning Thru Discussion, Revised Edition, Beverly Hills, California: Sage.

Houle, C. (1976) 'Deep Traditions Of Experiential Learning', in Keeton, M. (ed) Experiential Learning: Rationale, Characterisitcs and Assessment, San Francisco, California: Jossey-Bass, pp. 19 – 33.

Howe, A (1988) Expanding Horizons: Teaching And Learning Through Whole Class Discussion, Sheffield: National Association for the Teaching of English.

Hoyle, E. (1995) 'Changing Conceptions of a Profession', in Busher, H. and Saran, R. (eds), Managing Teachers as Professionals in Schools, London: Kogan Page, pp. 59 – 70.

Hoyle, E. and John, P. (1995) Professional Knowledge And Professional Practice, London: Cassell.

Huberman, A. and Miles, M. (1998) 'Data Management And Analysis Methods', in Denzin, N. and Lincoln, Y. (eds), Collecting and Interpreting Qualitative Materials, London: Sage, pp. 179 – 210.

Hughes, M. (1998) 'More than the Sum of Its Parts', in Walford, G. (ed), Doing Research About Education, London: Falmer Press, pp. 93 – 110.

Hull, C. (1985) 'Between The Lines: The Analysis Of Interview Data As An Exact Art', British Educational Research Journal, Vol. 11, No. 1, pp. 27 – 32.

Jahoda, M. (1963) The Education Of Technologists: An Exploratory Case Study At Brunel College, London: Tavistock Publications.

Janesick, V. (1998) 'The Dance of Qualitative Research Design: Metaphor, Methodolatry, and Meaning', in Denzin, N. and Lincoln, Y. (eds), Strategies of Qualitative Inquiry, London: Sage, pp. 35 – 55.

Jarvis, P. (2001) Universities And Corporate Universities: The Higher Learning Industry In Global Society, London: Kogan Page.

Jarvis, P. and Tosey, P. (2001) 'Corporations And Professions', in Jarvis, P (ed), The Age Of Learning: Education And The Learning Society, London: Kogan Page, pp. 147 – 156.

Jenkins, D. (1984) 'Chocolate Cream Soldiers: Sponsorship, Ethnography and Sectarianism', in Burgess, R.(ed), The Research Process in Educational Settings: Ten Case Studies, London Falmer Press, pp. 235 – 250.

Kartalopoulos, S. (1996) Understanding Neural Networks and Fuzzy Logic: Basic Concepts and Applications, New York: Institute of Electrical and Electronic Engineers.

Kiesler, C. (1971) The Psychology of Commitment: Experiments Linking Behaviour To Belief, London: Academic Press.

Kelsall, R., Poole, A. and Kuhn A. Graduates: The Sociology of an Elite, London: Methuen.

Kemmis, S. (1980) 'The Imagination of the Case and the Invention of the Study', in Simons, H. (ed), Towards a Science of the Singular: Essays about Case Study Research in Educational Research and Evaluation, East Anglia: Centre for Applied Research in Education, Occasional Publication No. 10. pp. 93 – 142.

Kemper, J. and Sanders, B. (2001) Engineers And Their Profession, 5th Edition, New York: Oxford University Press.

Kerlinger, F. (2000) Foundations of Behavioural Research, 4th Edition, New York: Holt, Rinehart and Winston.

Kharbanda, O. and Stallworthy, E. (1990) 'Management for Engineers', International Journal of Operations and Production Management, Vol. 10, No. 6, pp. 2 – 87.

Knapper, C. and Cropley, A. (2000) Lifelong Learning In Higher Education, 3rd Edition, London: Kogan Page.

Kokawa, M., Nakamura, K. and Oda, M. (1975) 'Experimental Approach to Fuzzy Simulation of Memorising, Forgetting and Inference Process', in Zadeh, et al. (eds), Fuzzy Sets and Their Applications to Cognitive and Decision Processes, Berkeley, California: Academic Press.

Kolb, D. (1984) Experiential Learning: Experience as The Source of Learning and Development, Engelwood Cliffs, New Jersey: Prentice Hall International.

Kosko, B. (1994) Fuzzy Thinking: The New Science of Fuzzy Logic, London: Harper Collins.

Kubler-Ross, E. (1970) On Death and Dying, London: Tavistock Publications.

Langer, S. (1953) Feeling and Form: A Theory of Art, New York: Charles Scribner's Sons.

Lave, J. (1988) Cognition in Practice: Mind, Mathematics and Culture in Everyday Life, Cambridge: Cambridge University Press.

Lave, J. and Wenger, E. (1991) Situated Learning: Legitimate Peripheral Participation, Cambridge: Cambridge University Press.

Lawn, M. (1996) Modern Times? Work, Professionalism and Citizenship in Teaching, London: The Falmer Press.

Lederman, L. (1990) 'Assessing Educational Effectiveness: The Focus Group Interview As A Technique For Data Collection', Communication Education, Vol. 3, No. 2, pp. 117 – 127.

Liveright, A. (1968) The Concept of Lifelong Integrated Learning: "Education Permanente" and Some Implications for University Adult Education, New York: International Congress of University Adult Education.

Lorenz, A. (2002) Kumar Bhattacharyya: The Unsung Guru, London: Random House Business Books.

Lukasiewicz, J. (1929) Elements Of Mathematical Logic, (transl. by Wojtasiewicz – 1963), London: Pergamon Press (based on original lectures, spoken from

memory in 1928/9).

McCulloch, G., Helsby G. and Knight P. (2000) The Politics Of Professionalism: Teachers And The Curriculum, London: Continuum.

Merilainen, M. and Pietarinen, J. (2002) 'Primary teachers professional development In the Context of Small Rural Schools', European Conference On Educational Research, University of Lisbon, 11-14 September 2002.

Merriam, S., Johnson-Bailey, J., Lee, M-Y., Kee Y., Ntseane G, and Muhamad, M. (2001) 'Power And Positionality: Negotiating Insider / Outsider Status Within And Across Cultures', International Journal of Lifelong Education, Vol. 20, September – October 2001, pp. 415 – 416.

Meurier, C. (2000) 'Understanding The Nature Of Errors In Nursing: Using A Model To Analyse Critical Incident Reports Of Errors Which Had Resulted In An Adverse Or Potentially Adverse Event', Journal of Advanced Nursing, Vol. 32, No. 1, pp. 202 – 207.

Mezirow, J. and Associates. (1990) Fostering Critical reflection In Adulthood: A Guide to Transformative and Emancipatory Learning, San Francisco: Jossey-Bass.

Mintzberg, H., Quinn J. and Ghosal, S. (1998) The Strategy Process, Revised European Edition, Harlow: Financial Times Prentice Hall.

Moore, W. (1970) The Professions: Roles and Rules, New York: Russell Sage Foundation.

Morrison, K. (1998) Management Theories for Educational Change, London: Paul Chapman Publishing.

Nguyen, H. and Walker, E. (1999) A First Course in Fuzzy Logic, 2nd Edition, New Mexico: Chapman and Hall / CRC.

Nixon, J., Martin, J., McKeown, P. and Ranson, S. (1997) 'Towards A Learning Professional: Changing Codes Of Occupational Practice Within The New Management Of Education', British Journal of Sociology of Education, Vol. 18, No. 1, pp. 5 – 28.

Ozga, J. (1995) 'Deskilling a Profession: Professionalism, Deprofessionalisation and the New Managerialism', in Busher, H. and Saran, R. (eds), Managing Teachers as Professionals in Schools, London: Kogan Page. pp. 21 – 38.

Ozga, J. and Lawn, M. (1981) Teachers, Professionalism and Class: A Study of Organised Teachers, London: The Falmer Press.

Patton, M. (1990) Qualitative Evaluation and Research Methods, 2nd Edition, London: Sage.

Perakyla, A. (1997) 'Reliability and Validity in Research Based Upon Transcripts', in Silverman, D. (ed), Qualitative Research Theory, Method and Practice, London: Sage, pp. 201 – 220.

Perkin, H. (1989) The Rise Of Professional Society England Since 1880, London: Routledge.

Perry, L. (1997) 'Critical Incidents, Crucial Issues: Insights Into The Working Lives Of Registered Nurses', Journal of Clinical Nursing, Vol. 6, pp. 131 – 137.

Pillay, H. (1998) 'Cognitive Skills Required in Contemporary Workplaces', Studies in Continuing Education, Vol. 20, No.1, pp. 71 – 81.

Porter, M. (1984) 'The Modification of Method in Researching Postgraduate Education', in Burgess, R. (ed), The Research Process in Educational Settings: Ten Case Studies, London Falmer Press, pp. 139 – 162.

Potts, A. (2000) 'Academic Occupations and Institutional Change: Reflections on Researching Academic Life', Academic Work and Life, Vol. 1, pp. 369 – 403.

Powell, J. (1985) 'Autobiographical Learning', in Boud, D., Keogh, R. and Walker, D. (eds), op.cit., pp. 41 – 50.

Pratt, J. (1999) 'Higher Education in Britain: Policy and Practice 1956-92', in Swann, J. and Pratt, J. (eds), Improving Education: Realist Approaches to Method and Research, London: Cassell.

Pring, R. (1995) Closing the Gap: Liberal Education and Vocational Preparation, London: Hodder and Stoughton.

Rallis, S. and Rossman, G. with Phleger, J. and Abeille, A. (1995) Dynamic Teachers: Leaders of Change, Thousand Oaks, California: Sage.

Reader, W. (1966) Professional Men: The Rise of the Professional Classes in Nineteenth-Century England, London: Weidenfield and Nicolson.

Reason, P. (1994) Participation in Human Inquiry, London: Sage.

Reynolds, M. (1998) 'Reflection and Critical Reflection in Management Learning', Management Learning, Thousand Oaks: June 1998, pp. 183 – 200.

Richards, T. and Richards, L. (1998) 'Using Computers In Qualitative Research', in Denzin, N. and Lincoln, Y. (eds), Collecting And Interpreting Qualitative Materials, London: Sage, pp. 211 – 245.

Riley, M. (1963) Sociological Research: A Case Approach, New York: Harcourt, Brace and World.

Robbins Report, (1963) The Committee on Higher Education, London: Her Majesty's Stationery Office, Cmnd. 2154.

Romer, T. (2002) 'Situated Learning and Assessment', Assessment and Evaluation In Higher Education, Vol. 27, No. 3, pp. 234 – 241.

Rose, S. (1992) The Making of Memory, London: Bantam Press.

Rosen, H. (1998) Speaking from Memory: A Guide to Autobiographical Acts and Practices, Stoke-on Trent: Trentham Books.

Ross, T. (1995) Fuzzy Logic with Engineering Applications, New York: McGraw-Hill.

Roth, W. (1999) 'Authentic School Science: Intellectual Traditions', in McCormick, R. and Paechter, C. (eds), Learning and Knowledge, London: Paul Chapman Publishing, pp. 6 – 20.

Rothstein, W. (1973) 'Professionalisation and Employer Demands: the Cases of Homeopathy and Psychoanalysis in the United States', in Halmos, P. (ed), Professionalisation and Social Change, The Sociological Review Monograph, No. 20, Keele: University of Keele.

Rudduck, J. (1978) Learning Through Small Group Discussions: A Study Of Seminar Work In Higher Education, Guildford: Society for Research into Higher Education.

Rudduck, J. (1991) Innovation and Change: Developing Involvement and Understanding, Milton Keynes: Open University Press.

Saks, M. (1995) Professions and the Public Interest: Medical Power, Altruism and Alternative Medicine, London: Routledge.

Sallis, E. and Jones, G. (2002) Knowledge Management in Education: Enhancing Learning and Education, London: Kogan Page.

Saltiel, D. (2003) 'Teaching Reflective Research And Practice On a Post Qualifying Child Care Programme', Social Work Education, Vol. 22, No.1, pp.105 – 111.

Sanderson, M. (1972) The Universities And British Industry 1850-1970, London, Routledge and Kegan Paul.

Sarason, S., Carroll, C., Maton, K. and Lorentz, E. (1977) Human Services And Resource Networks, San Francisco: Jossey-Bass Publishers.

Schon, D. (1983) The Reflective Practitioner: How Professionals Think In Action, London: Temple Smith.

Schratz, M. and Walker, R. (1995) Research As Social Change: New Opportunities For Qualitative Research, London: Routledge.

Scott, J. (1990) A Matter Of Record: Documentary Sources In Social Research, Cambridge: Polity Press.

Selwyn, N. and Robson, K. (1998) 'Using e-mail as a research tool ', Social Research Update 21, Guildford: Department of Sociology, University of Surrey.

Shattock, M. (1994) The UGC And The Management Of British Universities, Buckingham: SRHE and the Open University Press.

Shattock, M. (1999) 'The Impact Of A New University On Its Community: The University Of Warwick', in Gray, H. (ed), Universities And The Creation Of Wealth, Buckingham: SRHE and The Open University, pp. 108 – 122.

Shattock, M. (2002) 'The Transformation Of The Civic Universities', in History of Education, Vol. 31, No. 6, pp. 623 – 634.

Siegel, A. and Siegel S. (1957) 'Reference Groups, Membership Groups and Attitude Change', Reprinted in Jahoda, M. and Warren, N. (eds), Attitudes: Selected Readings, Harmondsworth: Penguin, pp. 187 – 195.

Sikes, P. (2000) ''Truth' and 'Lies' Revisited', British Educational Research Journal, Vol. 26, No. 2, pp. 257 – 270.

Sikes, P., Measor, L. and Woods, P. (1985) Teacher Careers Crises and Continuities, London: The Falmer Press.

Silver, H. (1990) Education, Change And The Policy Process, Lewes: The Falmer Press.

Silverman, D. (2000) Doing Qualitative Research: A Practical Handbook, London: Sage.

Silverman, D. (2001) Interpreting Qualitative Data: Methods For Analysing Talk, Text And Interaction, 2nd Edition, London: Sage.

Simon, E (1996) 'Student Numbers 1911 – 1971', in. Shattock, M. (ed), The Creation Of A University System, Oxford: Blackwell., pp. 47 – 56.

Simons, H. (1980) Towards a Science of the Singular: Essays about Case Study Research in Educational Research and Evaluation, East Anglia: Centre for Applied Research in Education, Occasional Publication No. 10.

Simons, H. (1996) 'The Paradox of Case Study', Cambridge Journal of Education, Vol. 26, No. 2, pp. 225 – 240.

Simons, H. (2000) 'Damned If You Do, Damned If You Don't: Ethical And Political Dilemmas In Evaluation', in Simons, H. and Usher R, (eds), Situated Ethics In Educational Research, London: RoutledgeFalmer, pp. 39 – 55.

Smith, A. (1998) 'Learning about reflection', Journal of Advanced Nursing, Vol. 28, No. 4, pp. 891 – 898.

Stake, R. (1994) 'Case Studies', in Denzin, N. and Lincoln, Y. (eds), Handbook of

Qualitative Research, London: Sage, pp. 236 – 247.

Stake, R. (1995) The Art of Case Study Research, Thousand Oaks, California: Sage.

Stake, R. (1998) 'Case Studies', in Denzin, N. and Lincoln, Y. (eds), Strategies of Qualitative Inquiry, London: Sage, pp. 86 – 109.

Stenhouse, L. (1967) Culture and Education, London: Nelson.

Stenhouse, L. (1993) 'Gathering Evidence By Interview', in Burgess, R and Rudduck, R. (eds), A Perspective On Educational Case Study: A Collection Of Papers By Lawrence Stenhouse, Coventry: University of Warwick, CEDAR.

Strain, M. (1995) 'Teaching As A Profession: The Changing Legal And Social Context', in Busher, H. and Saran, R. (eds), Managing Teachers as Professionals in Schools, London: Kogan Page, pp. 39 – 58.

Strauss, A. and Corbin, J. (1998) Basics Of Qualitative Research: Techniques And Procedures For Developing Grounded Theory, Thousand Oaks, California: Sage.

Street, A. (1998) 'In/forming *Inside Nursing*: Ethical Dilemmas in Critical Research', in Shacklock, G. and Smyth, J. (eds), Being Reflexive in Critical Educational and Social Research, London: Falmer, pp. 146 – 158.

Thompson, E. (1970) Warwick University Ltd., Harmondsworth: Penguin Education.

Thomson, R., Bell, R., Holland, J., Henderson, S., McGrellis, S. and Sharpe, S. (2002) 'Critical Moments: Choice, Chance and Opportunity in Young People's Narratives of Transition', Sociology, Vol. 36, No. 2, 335 – 353.

Tolman, C. (1987) 'Human Evolution and the Comparative Psychology of Levels', in Greenberg, G. and Tobach, E. (eds), Cognition, Language and Consciousness: Integrative Levels, Hillsdale, New Jersey: Lawrence Erlbaum Assoc. pp. 185 – 208.

Tripp, D. (1993) Critical Incidents In Teaching: Developing Professional Judgement, London: Routledge.

Tripp, D. (1998) 'Critical Incidents in Action Inquiry', in Shacklock, G. and Smyth, J. (eds), Being Reflexive in Critical Educational and Social Research, London: Falmer, pp. 36 – 49.

Tulving, E. (1983) Elements of Episodic Memory, Oxford: Oxford University Press.

Turner, B. (1969) Management Training for Engineers, London: Business Books Ltd.

Van Ments, M. (1990) Active Talk: The Effective Use of Discussion in Learning, London: Kogan Page.

Vaughn, S., Schumm, J. and Sinagub, J. (1996) Focus Group Interviews in Education

and Psychology, Thousand Oaks, California: Sage.

Walford, G. (1998) 'Research Accounts Count', in Walford, G. (ed), Doing Research About Education, London: Falmer Press, pp. 1 – 10.

Walker, R. (1980) 'The Conduct of Educational Case Studies: Ethics, Theory and Procedures' in Dockrell, W. and Hamilton, D. (eds), Rethinking Educational Research, London: Hodder and Stoughton, pp. 30 – 63.

Wellington, J. (1996) Methods and Issues in Educational Research, Sheffield: University of Sheffield Department of Education.

Wellington, J. (2000) Educational Research: Contemporary Issues, and Practical Approaches, London: Continuum.

Wenger, E. (1998) Communities of Practice: Learning, Meaning and Identity, Cambridge: Cambridge University Press.

Whitbeck, C. (1998) Ethics in Engineering Practice and Research, Cambridge: Cambridge University Press.

Wideen, M. and Andrews, I. (1984) 'Implications for Practice', in Hopkins, D. and Wideen, M. (eds), Alternative Perspectives on School Improvement, Lewes: Falmer Press, pp.189 – 202.

Willmott, H. (2000) 'Organising The Profession: A Theoretical And Historical Examination Of The Development Of The Major Accountancy Bodies In The UK', in Edwards, J. (ed), The History of Accounting, Vol. IV, pp. 233 – 269.

Woods, P. (1986) Inside Schools: Ethnography in Educational Research, London: Routledge and Kegan Paul.

Woods, P. (1993) Critical Events in Teaching and Learning, London: Falmer Press.

Woods, P. (1998) 'Critical Moments in the *Creative Teaching* Research', in Walford, G (ed), op.cit., pp. 42 – 75.

Yan, J., Ryan, M. and Power, J. (1994) Using Fuzzy Logic: Towards Intelligent Systems, Hemel Hempstead: Prentice Hall International.

Yin, R. (1992) 'The Case Study Method as a Tool for doing Evaluation', Current Sociology, Vol. 40, No. 1, pp. 121 – 137.

Yin, R. (1993) Applications of Case Study Research, Thousand Oaks, California: Sage.

Zadeh, L. (1965) 'Fuzzy Sets', Information and Control, Vol. 8, pp. 338 – 353.

Zuckerman, S (1996) 'The Growth Of Higher Education', in Shattock, M (ed), The Creation Of A University System, Oxford: Blackwell, pp.72 – 79.