ACHIEVING CLOSURE:
THE FUNCTION OF FEEDBACK
IN E-LEARNING ACTIVITIES

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Thesis submitted to Imperial College London
for the degree of Doctor of Philosophy

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ABSTRACT

E-learning was described in 1999 as "the next big killer application for the Internet", but many of the ambitious visions promised in e-learning's "first wave" have proved to be illusory. In the current environment, calls have been made for a greater understanding and conceptualisation of the processes involved in e-learning, as well as new instructional theories which can inform e-learning design.

This research investigated an important aspect of learners' experience of e-learning - their responses on receiving instructional feedback. Specifically, the research focused on the responses of business learners to feedback in e-learning activities designed to develop their problem-solving skills. A qualitative methodology was used, combining exploratory and quasi-experimental approaches, and using semi-structured interviews and observation with employees at a professional services firm.

The thesis argues that learners' responses on receiving feedback are influenced principally by four factors:

- their level-of-expertise in the subject covered in the e-learning application;
- their style-of-engagement with the e-learning application;
- their sense of inquiry generated by the task which precedes the feedback;
- the attributes of feedback.

Empirical findings expose deficiencies in current theoretical explanations of the function of feedback, which do not adequately account for learners' responses on receiving feedback. From the learner's perspective, unless feedback generates a sense of closure, it is unlikely to be perceived as adding value. It is argued that the importance of closure is not sufficiently represented in current theories about the function of feedback, and that a re-conceptualisation of its function is required. To this end, a conceptual framework is proposed to represent learners' experiences of e-learning feedback. Recommendations are then given for the instructional design of e-learning feedback.

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PART ONE

SETTING THE SCENE

CHAPTER ONE
SETTING THE SCENE

1.1 INTRODUCTION

E-learning was described in 1999 as "the next big killer application for the Internet"[1]. Supporting this prediction, economic forecasts estimated that the market value of the global corporate e-learning sector could reach $23bn by 2004, representing almost one-fifth of the total spend on corporate training (Kelly, 2001; Fisher, 2002). However, it has also been recognised that the pedagogic models which have served instructor-led training may be inadequate for the e-learning environment. There have been calls for new theories of instructional design, and more research to promote a greater understanding of the processes involved in e-learning (Boyle, 2002).

The research outlined in this thesis aimed to contribute to the call for more research by exploring business learners' experiences of instructional feedback in self-paced e-learning activities. The importance of feedback in the process of learning is widely recognised, and has been described as "an essential construct for many theories of learning and instruction" (Bangert-Drowns et al., 1991). Feedback is particularly important to learners who are developing business problem-solving skills, since these skills are developed through regular practice (Dreyfus & Dreyfus, 1986; Feltovich, Ford & Hoffman, 1997) and by reflecting on feedback which indicates the efficacy of that practice (e.g. Schon, 1983). As Laurillard (1993: 61) has said, "action without feedback is completely unproductive for a learner".

Chapter 1 makes the case for this research. It begins by introducing the broad context of the corporate e-learning sector, and explains why a study of learners' experiences of e-learning feedback is an important contribution to educational research. The chapter continues with a statement of purpose, and then describes the empirical setting chosen for the research, which was a global professional services organisation which made extensive use of e-learning to develop employees' problem-solving skills. Definitions are provided in section 1.7, and the chapter concludes by describing the organisation of this thesis.

1.2 THE BROAD CONTEXT FOR THIS RESEARCH

To corporate organisations, e-learning offers attractive benefits over class-based instructor-led training, such as lower logistical costs, the ability to reach dispersed audiences quickly and with greater consistency of message, and - using supplementary tools such as learner management systems - more power to manage employees' training and development (Lamb, 2001; Barron, 2002). In pursuit of these benefits, the global e-learning corporate market has grown from an

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[1] John Chambers, CEO of Cisco Systems, at a keynote speech at the COMDEX conference in Dec. 1999.

estimated value of $3.4bn in 2000 to $6.4bn in 2001 (Barron, 2002). Forecasts made in 2001 by IDC, an IT market analysis group, estimated that the market value could reach $23bn by 2004 (Kelly, 2001).

However, many of the grandiose visions promised in e-learning's "first wave" (Taylor, 2002) proved to be illusory: technological problems were frequent; and the predominant instructional model was of "page-turner" tutorials (Kruse, 2000) which were poorly received by audiences, leading to low e-learning completion rates (Kindley, 2002; Taylor, 2002; Powell, 2003).

In the current environment of e-learning's "second wave", alternative models are advocated such as scenario-based tutorials (Brodsky, 2003; Kindley, 2002), games and simulations (Powell, 2003), and online discussion forums or other forms of CSCL ('Computer Supported Collaborative Learning') which involve electronic means of communication and collaboration. However, many of these alternatives come with their own implementation problems. For example, game-based e-learning has met with some scepticism in the UK corporate sector, especially given the high build costs (Powell, 2003). Furthermore, experiences of CSCL in educational settings have highlighted the difficulties of promoting reflective, critical debate between students without considerable input from skilled moderators (Salmon, 2000; Laurillard 2002).

In recognition of these substantial difficulties, calls have been made for new instructional theories for multimedia training programs, as well as greater understanding and conceptualisation of the processes involved in e-learning (Boyle, 2002). These are fundamental concerns with important implications for the design and development of e-learning. In trying to address them, there has been a sharing of experiences and 'lessons learned', as well as attempts to make sense of those experiences with reference to accepted theories of learning. These activities have coincided with growing recognition in the theoretical literature of the importance of the socio-cultural aspect of learning (following in the tradition of Vygotsky, 1978), and of authentic, situated approaches to learning and knowing (e.g. Lave and Wenger, 1991; Brown, Collins and Duguid, 1989).

In response to the new directions in the theoretical literature, e-learning research has extended its scope to CSCL (Computer Supported Collaborative Learning), and CSLEs (Computer Supported Learning Environments), which attempt to simulate real-life contexts. However, these developments have been at the expense of research on self-paced e-learning, which is delivered in electronic form (e.g. CD-ROM or web), and which can be undertaken by learners at a location and time of their choosing. E-learning typically combines tutorials and practice activities, and does not involve collaboration and simulation. The neglect of self-paced e-learning is undesirable for theoretical and pragmatic reasons.

A theoretical concern is that a decline in research on self-paced learning (whether 'e' or 'non-e') may lead to an impoverished conceptualisation of the processes of learning, emphasising social aspects but without fully accounting for the role of individual efforts. The importance of "situated learning" (Lave and Wenger, 1991) is widely and quite rightly recognised, but its proponents have cautioned against interpreting the term too narrowly. They argue that situated learning is a

theory of learning, and does not prescribe a particular place or structure for learning and instruction, for "there is no activity that is not situated" (Ibid., p33). Others have cautioned that situated learning not only occurs in socially-based, on-the-job environments, but also legitimately occurs when learners are using self-paced training materials which are positioned to help them participate in their community of practice (Greeno, 1997; Clancey, 1995).

The second concern is a pragmatic one. Many business organisations rely heavily on self-paced e-learning (ASTD Report, 2001), and are projected to continue to do so. Neglect of self-paced e-learning as a research topic therefore risks creating a gap between business practice and academic research.

1.3 IMPORTANCE OF THIS RESEARCH

It is argued above that emphasis in the theoretical literature on the socio-cultural aspects of learning has encouraged a trend towards research on collaborative learning at the expense of self-paced learning. The lack of empirical research on the role of self-paced e-learning to develop learners' problem-solving skills is particularly acute (Jonassen, 2001). Yet in the professional services industries, provision of client services relies as much on problem-solving skills involving interpretation and judgement than on the application of technical rules and procedures - perhaps even more so. Problems are often "ill-structured" (Simon, 1977), and single solutions are rare.

Given the ill-structured nature of many business problems, rote learning of general principles and guidelines is insufficient. Of even greater importance is the ability to apply those principles and to practice the skills of problem-solving, either in a 'protected' environment such as a self-paced e-learning application, or in the real-world with all its attendant risks.

E-learning applications aimed at developing business problem-solving skills usually provide practice opportunities by including scenario-based activities, so that users can apply general principles to problems set in realistic scenarios, try out different solutions, and learn from the consequences in a risk-free environment. This form of scenario-based learning is promoted as a "step beyond" (Kindley, 2002) traditional page-turners. The typical structure of a scenario-based e-learning activity is represented in figure 1.

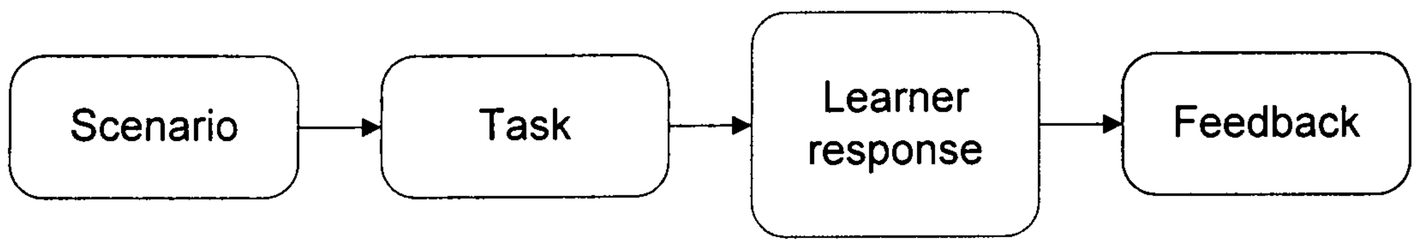


Figure 1: Typical structure of a scenario-based e-learning activity

In spite of the acknowledged importance of feedback in practice activities, research aimed at understanding the conditions for effective e-learning feedback have been limited, both in scope and conclusiveness. In terms of scope, much of the research on e-learning feedback and other

forms of programmed feedback has investigated rote learning processes rather than higher-order learning such as the development of problem-solving skills, and used children and university students as subjects rather than business learners (Mory 1996). In terms of conclusiveness, reviews of prior research highlight inconsistencies and contradictions between findings which has meant that implications for instructional design have been difficult to draw (Mory, 1992, 1996; Kulik and Kulik, 1988).

The deficiencies in scope and the inconclusiveness of findings suggested a need for more feedback research. This study aimed to contribute to this need by investigating the effectiveness of e-learning feedback in scenario-based activities designed to give learners practice in solving business problems. An appropriate research design was required to achieve this aim. Without theoretical frameworks which specifically related to business self-paced e-learning, an experimental hypothetico-deductive approach was thought to be neither desirable nor feasible. An alternative option was to adopt an exploratory approach aimed at revealing, from the learners' perspective, their expectations of, and responses to e-learning feedback. From a methodological perspective, the absence of a clear theoretical or research baseline suggested that an exploratory approach would be more suitable, and was therefore selected for this research.

The empirical setting selected for this research was a professional services organisation with a reputation as a committed and innovative producer of bespoke e-learning applications. The organisation provided access to a large sample of business learners as well as a range of applications and feedback designs which could be used as research materials.

With this context in mind, the purpose of this research is summarised next.

1.4 STATEMENT OF PURPOSE

This research aimed to investigate, from the learners' perspective, the function of feedback in self-paced, scenario-based e-learning activities. To achieve this aim, the research explored business learners' expectations of, and responses to feedback in e-learning applications designed to develop their problem-solving skills. Learners were drawn from a professional services organisation.

Learners' expectations and responses were investigated to attempt to identify influencing variables, and to construct a conceptual framework representing learners' experiences of e-learning feedback. The research questions which provided a focus for this research were:

- What do learners expect from e-learning feedback?
- What influences learners' expectations of e-learning feedback?
- What are learners' outcomes on receiving e-learning feedback?
- What influences learners' outcomes on receiving e-learning feedback?
- What are the implications for a theoretical understanding of the function of e-learning feedback?
- What are the implications for the instructional design of e-learning feedback?

Having defined the research purpose, the next section introduces the empirical setting chosen for this research.

1.5 EMPIRICAL SETTING

The empirical setting for this research was a professional services organisation, from which seventy-two employees from the UK and North American offices were interviewed in four different studies about their experiences of e-learning feedback. One of the four studies involved observing the interviewees whilst they completed e-learning activities.

The organisation from which interviewees were drawn was selected for several reasons. Firstly, as my former employer, I had a privileged position which facilitated the negotiation of access to interviewees. Secondly, training was taken seriously by the organisation as a way to increase employees' professional knowledge and skills, and all employees were expected to undertake skills development training. Thirdly, employees were familiar with e-learning as a form of training. Fourthly, the organisation had a reputation as a committed, innovative and successful designer of e-learning applications, including those targetted to develop employees' problem-solving skills.

At the time this research was conducted, the organisation was one of the "Big 5" accountancy and advisory services organisations, operating in the UK and globally. The organisation principally comprised an audit practice and a management consultancy practice. Most of the interviewees were drawn from the consultancy practice.

My experience as a consultant gave me an insight into the working culture of the people whom I interviewed. I have worked in Europe and North America on projects with similar demands and in the same offices as some of the interviewees. However, knowing that the idiosyncrasies of my own personal experiences might inadvertently generate bias, I also conducted informal interviews with members of the organisation to ascertain their perceptions of the working culture. In matters of substance, their perceptions were similar to my own. What follows is my perspective on the 'typical' consultant, and the working environment he or she inhabits. Inevitably, it is somewhat of a caricature. Nevertheless, by generalising about common features, my aim is to facilitate readers who wish to make case-to-case generalisations from the research findings to their own settings. The portrayal of the consultancy practice is followed by a brief introduction to the audit practice and the operational research & support unit, from which some interviewees from study 3 were drawn.

1.5.1 MANAGEMENT CONSULTANCY PRACTICE

Management consultants are engaged by clients in a number of capacities, usually to address problems where client staff do not have the resources or skills to resolve the problems themselves. Projects vary in length between a few weeks to as long as two years. More often than not, consultants are required to work on the client's premises away from their own office. Frequently, this requires consultants to travel regularly and to stay in hotel accommodation for long periods of time.

Consultants are recruited partly for their knowledge of an industry or sector, and partly for their adaptability, drive, problem-solving skills, and interpersonal skills. By nature, consultants are usually people-oriented, and are encouraged to develop client-relationship and team-working skills. It is usual for consultants to be qualified at least to undergraduate level.

Management consultants are encouraged to continually develop their skills through professional development courses, and are regularly appraised by a coach or mentor. Because of the logistics of bringing consultants together to a single location for class-based training, e-learning is seen as an attractive alternative for staff training.

1.5.2 AUDIT PRACTICE

Audit staff are usually graduates who have, or are training for, professional post-graduate qualifications. All qualified audit staff are required to undertake a minimum number of Continuing Professional Education ('CPE') hours. Although much of this CPE training is directly related towards maintaining their professional skills, they are also expected to develop other skills such as problem-solving and interpersonal skills, and to be fully appraised of firm-wide policy on issues such as ethics and project management.

1.5.3 OPERATIONAL RESEARCH & SUPPORT

Operational research & support ('OR&S) units are usually made up of employees who have been recruited specifically for their previous experience in managing work-flows, such as payroll services. Their training requirements tend to be specific to a particular operation. However, enlightened organisations such as the one chosen for this research encourage OR&S employees to engage in development courses such as those that can be delivered using e-learning.

1.6 SUMMARY

The development of problem-solving skills depends upon regular practice, as well as reflection on the feedback generated from those practice opportunities. In the corporate sector, problem-solving skills were traditionally developed through role-play and coaching programs but are increasingly being developed using e-learning technologies which include self-paced practice activities. However, the extension of e-learning to the corporate curricula has not been matched by an equivalent development in research, leaving an important gap between business practice and academic research. This research aimed to contribute to this area by exploring business learners' expectations of, and responses to instructional feedback in self-paced, scenario-based e-learning, and by identifying theoretical and empirical implications.

1.7 DEFINITIONS

E-learning

E-learning is defined in this thesis as 'electronically-mediated learning' using programmed software applications. As such, the term excludes simulations, gaming systems and intelligent tutoring systems which have the ability to generate non-programmed responses to learners' inputs. E-learning is typically delivered using CD-ROMs, or using the technologies of the internet.

Programmed feedback (see also section 2.2.3)

Programmed feedback is the programmed response which is triggered by the learner's interaction with the immediately-completed task. The term includes the programmed response to closed questions and to open, essay-type questions. In this thesis, the term refers to formative, instructional feedback designed to facilitate learning, rather than summative feedback designed to communicate an overall assessment of the learner's performance.

Programmed feedback is usually composed of verification (except in response to open questions) and elaboration.

- Verification tells learners whether their response is correct or incorrect. Feedback for an open question does not give a verificational response if the computer is unable to assess the essay response, in which case non-verificational feedback such as a model answer is usually given.
- The elaborative component of feedback facilitates learning by providing information; for example an explanation, an example of correct procedures, or reference to the original instruction. Elaboration usually follows verification.

Activity

This term refers to the combined sequence of scenario (which introduces the problem situation), task, learner's interaction with the task, and feedback. In the educational literature, activities are also called exercises.

Task

Tasks require some form of interaction from the learner. In an e-learning context, tasks are usually either 'open' or 'closed'.

- Open questions, such as "given the (previously-stated) background scenario, how would you deal with this problem?" require learners to construct an essay-type response.
- Closed questions, such as multiple choice questions ('MCQs') offer learners several response options from which they must choose a single answer which they believe to be the correct answer.

1.8 ORGANISATION OF THIS THESIS

This thesis is organised in six parts. The first five parts contain the detail relating to the setting, academic context, design, analysis or conclusions of the research. Part six contains appendices and references.

Part One introduces the wider setting for this research:

> ***Chapter One*** makes a case for the importance and potential significance of this research by presenting the wider context of e-learning, the difficulties in successfully implementing e-learning, the role of feedback in practice activities, and the need for research which can inform improvements in e-learning feedback design. The empirical setting is also described.

Part Two reviews the prior literature relevant to this research topic:

> ***Chapter Two*** presents a review of the theoretical and empirical literature pertaining to feedback, business problem-solving, and the nature of expertise. Because the design of e-learning feedback owes much to earlier research on feedback in programmed or intelligent tutoring applications, this earlier research literature is also discussed.

Part Three presents the options and decisions made relating to methodological and procedural design:

> ***Chapter Three*** presents the methodological and epistemological choices and decisions which shaped the research design.
>
> ***Chapter Four*** presents the selection of data collection, sampling and analysis methods. The use of a pilot study is also discussed.
>
> ***Chapter Five*** describes the detailed procedures and decisions surrounding the conduct of telephone and face-to-face interviews, and the use of materials from e-learning applications to prompt discussion about interviewees' experiences of e-learning feedback.

Part Four presents an analysis of the research findings:

> ***Chapter Six*** presents findings from study 1 (n=29), in which learners were interviewed about *Zentoria*, a project-management e-learning application, and specifically about their responses to three feedback examples which followed open-question tasks. Interview quotations are used to illustrate the main themes and concepts identified from the findings, including those of the importance of *inquiry* and *closure*. This chapter goes on to present interviewees' evaluations of nine feedback designs for open-question tasks.
>
> ***Chapter Seven*** presents findings from studies 2 (n=18) and 3 (n=13), which involved similar research aims and materials and which were therefore analysed together. In both studies, learners were interviewed about their responses to three feedback examples

which followed multiple choice questions. In study 2, the feedback examples were taken from *Coaching Advantage*, which taught coaching and mentoring skills; in study 3, feedback examples were taken from *Navigating the Grey*, which taught business ethics.

A conceptual framework is proposed which brings together key influences on learners' expectations of feedback, and their outcomes on receiving feedback. The important of level-of-expertise on expectations and outcomes is illustrated.

Chapter Eight presents findings from study 4 (n=12), which differed from previous studies in that interviewees discussed storyboard feedback designs, rather than recollections of feedback from previously-completed applications. The storyboard designs were created to test five hypotheses developed from analysis of prior studies. The results of this hypothesis-testing are then presented.

Part Five provides a summary and discussion of the main conclusions:

Chapter Nine presents a consolidated overview of the findings, thereby developing the final structure of the proposed conceptual framework representing learners' expectations of, and responses to, e-learning feedback.

Chapter Ten briefly restates the key findings, and identifies the theoretical contribution of the research. The implications of the findings are discussed with respect to the empirical questions they raise, and recommendations are given for the instructional design of e-learning feedback. The chapter then acknowledges the influence of 'self' on the research process, and describes my own background and experiences including those at the organisation from which interviewees were drawn. A critique of the research design is also included. Finally, recommendations are made for further research.

Part Six contains appendices and references.

PART TWO

REVIEWING THE LITERATURE

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

2.1.1 POSITIONING THE LITERATURE REVIEW

The purpose and presentation style of a literature review are influenced by the methodological orientation of the research. The principal methodological traditions of the social sciences - commonly referred to as 'quantitative' or 'qualitative' (Bryman, 1988; Oakley, 2000) - each influence not only the design of the research, but also the conduct of the literature review and its presentation in a doctoral thesis.

Research guided by a hypothetico-deductive orientation often aims either to extend or challenge existing theoretical perspectives or prior research. In those circumstances, the purpose of conducting a literature review at the beginning of the research is to identify gaps and inconsistencies in the relevant theoretical and empirical literature, and then to develop hypotheses to be tested. These activities are largely completed before the empirical work is started. When presenting the literature review in a doctoral thesis, an appropriate style is one which systematically builds arguments in favour of the hypotheses to be tested.

The purpose of the literature review in exploratory studies such as this one tends to be more investigative. The initial review surveys the landscape of relevant theoretical perspectives and prior research, and in doing so sets the context for the research, provokes questions to be explored, and suggests methods of inquiry. Once the research is begun, preliminary findings often prompt a re-examination of relevant literature, and this activity then informs the evolution of the research. This iterative process is important because the very nature of exploratory research makes it difficult to anticipate *which* empirical studies and theoretical perspectives will be most relevant to an interpretation of the findings.

The iterative process in exploratory research also raises questions about how best to present the literature review; in particular, because some references only make sense in relation to specific empirical findings. In this thesis, the literature review is presented as a survey of relevant literatures which influenced development of the research questions, and in addition, reference to theoretical and empirical literature is made in later chapters which present and discuss the empirical findings.

2.1.2 LITERATURES REVIEWED

The focus for this research was a study of e-learning feedback in applications aimed at developing business learners' problem-solving skills. The interdisciplinary nature of this research topic required an investigation of several subjects - instructional feedback, problem-

solving, and the development of problem-solving skills - and across several disciplines - educational psychology, cognitive psychology, and to a certain extent, management learning.

A key theme to emerge from the review was that although a large body of research has investigated children's and college students' responses to feedback for simple learning tasks, very little feedback research has investigated the experiences of business learners using e-learning applications to develop their problem-solving skills. The review nevertheless identified important themes and models which influenced the interpretation of findings from this research, and so these are introduced in this chapter.

The literature review is organised as five sections:

- Section 2.2 provides a context for the literature review by defining: 'e-learning'; three forms of feedback ('programmed', 'e-learning', and 'intelligent'); and the attributes which are commonly ascribed to programmed feedback.
- Section 2.3 draws on the educational psychology literature to identify theoretical perspectives on the function of feedback within the learning process - whether facilitated in an e-learning application, in the classroom, or in a community of practice. Askew and Lodge (2000) have commented that there are multiple interpretations of the function of feedback, which differ according to their referential theories of learning. In acknowledging these differences, this section considers feedback's function from the perspective of the four paradigms of learning which dominate the educational literature: behaviourism, cognitivism, constructivism and socio-constructivism.
- Section 2.4 goes on to discuss what has been said specifically about the function of *programmed* feedback from the perspective of the four paradigms.
- Section 2.5 reviews the empirical and methodological literature relating to programmed feedback.
- Section 2.6 reviews the literature on problem-solving, drawing out areas of relevance to business problem-solving and programmed feedback.

2.2 DEFINITIONS

2.2.1 DEFINITION OF E-LEARNING

E-learning is defined in this thesis as 'electronically-mediated learning' using programmed software applications. As such, the term *excludes* simulations, gaming systems and intelligent tutoring systems which have the ability to generate non-programmed responses to learners' inputs. E-learning is typically delivered using CD-ROMs, or using the technologies of the internet, and is sometimes referred to as computer-based training or 'CBT'.

2.2.2 DEFINITION OF ACTIVITY AND TASK

The focus in this research is on 'scenario-based activities' which are widely used in business e-learning applications. Figure 2 portrays the typical structure of a scenario-based activity, comprising a scenario to provide the contextual background, a task, the response of the learner, and feedback.

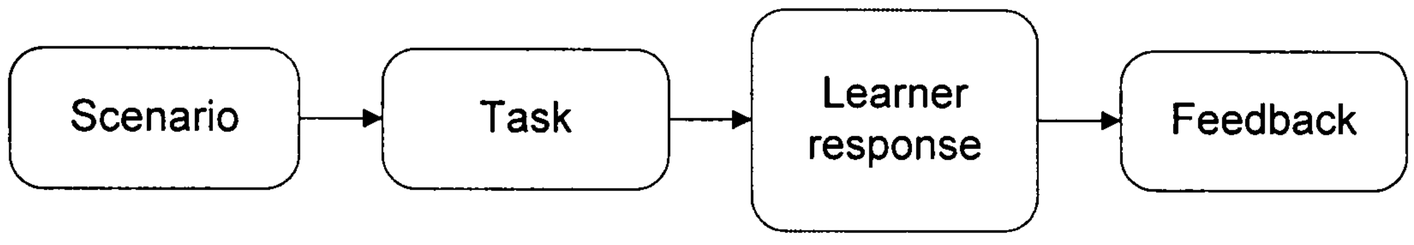


Figure 2: Typical structure of a scenario-based e-learning activity

Tasks require some form of interaction from the learner. In an e-learning context, tasks are usually defined as either 'open' or 'closed'.

- Open questions, such as "given the (previously-stated) background scenario, how would you deal with this problem?" require learners to construct an essay-type response.
- Closed questions, such as multiple choice questions ('MCQs') offer learners several response options from which they must choose a single answer which they believe to be the correct answer.

2.2.3 DEFINITION OF PROGRAMMED INSTRUCTIONAL FEEDBACK

The importance of instructional feedback in the process of learning has been underscored by many authors (e.g. Gagne, 1985; Laurillard, 2002; Bangert-Drowns et al., 1991). However, the definition of 'programmed feedback' as a subset of 'instructional feedback' requires some clarification. In the context of computer-based training, feedback has been described as “the instructional system’s response to the learner’s actions ... which provides information to learners about the quality of their response” (Kulhavy & Wager, 1993: 75). However, this definition would exclude model-answer feedback given to learners who have constructed short-essay responses to open questions. Therefore, in this thesis, the term is defined as the computer's programmed response triggered by the learner's interaction with the immediately-completed

task, and includes the programmed response to closed questions and to open, essay-type questions. In this thesis, the term refers to formative, instructional feedback designed to facilitate learning, rather than summative feedback designed to communicate an overall assessment of the learner's performance.

It may be useful at this point to distinguish between the terms 'programmed', 'e-learning' and 'intelligent' feedback:

- *Programmed* feedback denotes feedback in paper-based or computer-based programmed instruction ('PI') or computer-based training ('CBT').
  - ➔ PI applications are rarely encountered today, but when they were the subject of research in the mid-twentieth century, they provided a linear series of frames (task, feedback, task, feedback, etc.), and were usually designed along behaviourist principles. The feedback associated with each available task response was programmed into the application.
  - ➔ CBT applications, although designed along different principles, are also 'static' in the sense that "everything has to be set in advance by the author within the fixed constraints of the ... medium" (Wenger, 1987: 4). This means that the feedback represents the *programming of the author's decisions* about what range of responses are possible for each task, and about what feedback should be given to the learner.
- *E-learning* feedback is defined in this thesis as programmed feedback contained in any electronically-based training medium such as a computer. 'E-learning feedback' is thus a sub-set of the term 'programmed feedback'. The term is used in much of this thesis because contemporary debate and research tends to use the term 'e-learning' in place of the terms 'programmed' learning, or CBT/CAI.
- *Intelligent* feedback denotes the type of adaptive feedback generated by applications using artificial intelligence. Wenger (Ibid., p4-5) describes instructional applications involving artificial intelligence as encoding the *knowledge of experts*. This means that the application can compose instructional interactions such as feedback dynamically, making decisions by reference to the encoded knowledge with which they have been provided, and allowing the possibility of making pedagogic decisions not anticipated by the experts.

Differences in the design of programmed feedback are defined by reference to several attributes: information type (verificational or elaborative); source (extrinsic or intrinsic); and attribute type (structural or elaborative). These attributes are defined in table 1. The focus in this research was on the elaborative attributes of feedback.

Attributes of feedback		
Information type	Verification	Verification tells learners whether their response is correct or incorrect (Mory, 1996). Verification is usually given for multiple choice questions ('MCQs'), which offer learners several response options from which they must choose what they believe to be the correct answer. Feedback for open questions which require an essay-type response does not usually give a verificational response unless the computer is able to assess the response using the technologies of natural language recognition.
	Elaboration	The elaborative component of feedback facilitates learning by providing additional information - for example an explanation, an example of correct procedures, or reference to the original instruction (Mory, 1996).
Source	Extrinsic (also called 'external')	Extrinsic feedback is an external comment on a learner's action, such as "correct"/"incorrect", rather than a natural consequence of his or her action (Laurillard, 2002: 56). In e-learning applications, all possible versions of extrinsic feedback are programmed into the application as part of its design.
	Intrinsic *(Not an attribute of programmed feedback, but defined here for comparative purposes)*	Intrinsic feedback denotes feedback given as a natural consequence of an action (Laurillard, 2002: 55). Intrinsic feedback is generated by instructional applications such as simulations (which use a generative mathematical model of a system), or virtual environments (which use a graphical model to display the visual and positional properties of a system) (Laurillard, 2002: 133).
Attribute type	Structural	Structural attributes are defined in this thesis as those which do not relate to the semantic content of the feedback. The principal structural attributes which have received attention in the programmed feedback literature are: timing; load and media
	Elaborative	Elaborative attributes are defined in this thesis as those which relate to the elaborative (i.e. non-verificational) component of feedback. Categorisation of the elaborative attributes of feedback is an important omission in the feedback literature (Kulhavy & Stock, 1989; Mory, 1996)

Table 1: Attributes of programmed feedback

2.3 FUNCTION OF FEEDBACK WITHIN THE LEARNING PROCESS

To provide a context for this research, this section compares the different theoretical interpretations of feedback's function within the process of learning. These theoretical interpretations are derived from the different perspectives on the phenomena of 'learning'. Greeno et al. (1996) provide a comprehensive analysis of three perspectives, which they categorise as behaviourist/empiricist, cognitive/rationalist, situative/pragmatist-socio-historic. However, this categorisation clouds important distinctions between constructivist and socio-constructivist perspectives, and so this thesis considers the function of feedback from four perspectives: behaviourist, cognitivist, constructivist, and socio-constructivist.

2.3.1 BEHAVIOURIST PERSPECTIVE

Until the late 1960s, the behaviourist perspective on learning informed the dominant interpretation of the function of feedback. Behaviourism "took the position that *knowing* could be characterised only in terms of observable connections between stimuli and responses" and that *learning* was the "forming and strengthening or weakening and extinguishing" of those connections through reinforcement and non-reinforcement (Greeno et al. 1996). According to the behaviourist perspective, the function of feedback was reinforcement.

Thorndike laid the groundwork for the feedback-as-reinforcement perspective, with his Law of Effect (1911, 1913). In its initial formulation, Thorndike maintained that when a response to a stimulus is followed by a "satisfying state of affairs" it is likely to be repeated again if presented with that same stimulus; when followed by an "annoying state of affairs", he asserted the likelihood that it will *not* be repeated (Thorndike, 1913). After extensive experimentation, the second, or 'Truncated' Law of Effect was developed (Thorndike, 1932), which essentially removed the role of negative reinforcement. This was because it was found that errors in rote learning tasks tended to persist (Thorndike, 1932; Skinner, 1958). Thereafter, behaviourists supported the use of feedback to provide positive reinforcement for successful responses to tasks, rather than punishment for incorrect responses. Discussion about the function of feedback concerned its potential to shape, reinforce and maintain desired learner responses. However, notions about the learner's *understanding*, and about the learner's rational selection of an appropriate response for the stimulus, were not a feature of the behaviourist perspective on feedback.

In historical terms, behaviourist principles represented an important theoretical development which raised critical questions about teaching methods prevalent at that time, when "the cane and the rod were the tools of the teaching profession" (Skinner, 1968). However, in modern texts on feedback, behaviourism is sometimes accorded only a passing footnote - if at all. The widespread rejection of behaviourist principles once the "cognitive revolution" (Gardner, 1987) took hold in the 1970s was perhaps inevitable given the behaviourists' dismissal of the role of cognitive processes in learning. Nevertheless, the reinforcement function of feedback - albeit explained in terms of cognitivist (e.g. Kulhavy, 1977) or social learning (Bandura, 1986) theories - is still recognised as important.

2.3.2 COGNITIVIST PERSPECTIVE

By the early 1970s, a Kuhnian paradigm shift caused serious doubts to be raised about the validity of the feedback-as-reinforcement perspective. The latter perspective was seriously challenged after repeated studies provided little evidence that feedback which followed positive responses provided reinforcement (e.g. see Anderson et al., 1971, 1972). Kuhn's portrayal of the history of science has suggested that a crisis which questions the validity of the existing theoretical paradigm gains momentum only if an alternative theoretical model is ready to fill the explanatory void. This happened in the early 1970s, when the dominance of the paradigm of feedback-as-reinforcement was eroded by the explanatory appeal of cognitivist, information-processing theories.

The cognitivist, information-processing view of learning was a dominant influence on educational research programs from the 1970s until the mid-to-late 1980s. The cognitivist perspective at that time implicitly reflected a rationalist ontology by presuming: firstly, that a fixed body of knowledge existed which needed to be acquired by the student; and secondly, that individual learning was about building accurate mental structures that reflected 'the way things really are' in the world (Woolfolk, 1998). The tutor's role (either human or computer) was knowledge transmission - guiding learners towards a more 'accurate' and 'complete' body of knowledge - largely by giving information and by identifying and correcting misconceptions.

In line with cognitivist principles, a new conceptualisation of feedback developed in which the function of feedback was to provide information which could be used by learners' 'information-processing systems' - i.e. the thinking mind, a phenomena which had been neglected by behaviourists. Askew and Lodge (2000) characterise this conceptualisation of feedback as a *gift* from the teacher to the learner, and argue that it is prevalent in current pedagogies. The teacher is viewed as 'expert', and feedback is a one-way communication, from teacher to student, to provide information to help the learner to learn. It is assumed that the person giving the information knows more than the person receiving it, that the person receiving the information does not already know it, that they want to hear it, and that this information will lead to improvement (Askew & Lodge, 2000).

2.3.3 CONSTRUCTIVIST PERSPECTIVE

The cognitivist perspective on learning began to wane once its predominantly rationalist assumptions (Gardner, 1987: 53) began to crumble, and once it became apparent that learning and knowing were strongly influenced by context and subjective interpretation. This was demonstrated by the continual difficulties in applying artificial intelligence technologies to semantic information-processing tasks (Dreyfus, 1992), and by research showing that people legitimately interpret information in different ways depending on their personal experiences and mental schemata (e.g. see research by the Bransford group in the early 1970s, cited in Gardner, 1987: 124-125).

Increasingly in recent years, cognitivism has been challenged by constructivist perspectives on learning, which sees personal knowledge not as a mirror of the external world, but as a personal

lens that is built through experience, thinking, exploration and discovery. The enhancement of personal knowledge is seen as the process of transforming, re-interpreting and re-organising knowledge. This view follows in the tradition of Piaget (e.g. 1970), and has been labelled by some as *endogenous constructivism* (Woolfolk, 1998) to emphasise that knowledge is generated internally by acting upon the outside world, and - by doing so - transforming one's understanding of it. The constructivist perspective is also represented in Kolb's (1984) portrayal of the experiential cycle of learning, which involves iterations between concrete experience, reflective observation, abstract conceptualization, and active experimentation.

Education from a constructivist perspective is about 'drawing out', rather than 'putting in'. The purpose of feedback is to help learners make connections and explore their own understandings. Feedback according to the constructivist perspective moves away from evaluative judgement about 'right' and 'wrong' knowledge, and is more about offering ideas and insights for further reflection. This approach to feedback has some features in common with counselling (Askew & Lodge, 2000), and is about encouraging learners to come to their own interpretations about the world.

The constructivist perspective emphasises the importance of internal mental processes, as learners take stock of feedback to critique their own knowledge and understanding. Feedback therefore has the potential to provoke *reflection*, a cognitive process which Butler and Winne (1995) - in their influential model of self-regulated learning - labelled "internal feedback". In the literature on self-regulated learning, the role of internal feedback (i.e. reflection) is a vital one. Recognising its importance, Butler and Winne (1995) expressed concern that traditional studies of feedback in educational settings have focused on external feedback delivered by tutors or computers. They added that these studies have overlooked the ways in which learners respond to, and reflect on feedback to guide their knowledge acquisition and reconstruction. This omission was addressed in the current research which explored learners' accounts of their experience of feedback.

Constructivist perspectives on feedback and self-regulated learning emphasise the role of cognitive dissonance or 'discrepancy', and point to the possibility of learners' responses to feedback other than correction of errors. For example, Chinn and Brewer (1993) looked at the ways science students responded to feedback designed to reveal the inadequacies of their 'naïve' theories of the physical world so that students were more receptive to being taught established scientific theories. The analysis showed that although one of the responses was to *correct* 'naïve' knowledge (which would be predicted according to the cognitivist perspective of feedback), students sometimes rejected the corrective feedback in order to protect the integrity of their personally-constructed - albeit erroneous - beliefs and schemata. In other words, the feedback was shown to fail to operate solely in a 'corrective' function. This was also a finding of the current research, and is discussed in particular in sections 7.5.6 and 8.7 of this thesis.

2.3.4 SOCIAL CONSTRUCTIVIST PERSPECTIVE

The constructivist perspective on learning is epitomised in Piaget's analogy of the child as a "little scientist" (Woolfolk, 1998), who learns by acting on the world and making sense of the consequences. Theorists advocating a socio-constructivist perspective, and following in the tradition of Vygotsky (1978), saw the analogy of the lone scientist as inherently flawed, because it failed to appreciate that learning is mediated by peers, adults (in the case of children), and the socio-cultural context. According to the socio-constructivists, knowledge reflects the outside world as filtered and mediated by culture, language, beliefs, interactions with others, direct teaching and modelling (Woolfolk, 1998). Proponents of a participative theory of learning go further by suggesting that learning is the process of establishing one's identify in, and becoming a participant of, communities of practice (Lave & Wenger, 1991).

According to the socio-constructivist perspective, the learner is neither a passive recipient of information (cognitivism), nor a subordinate of the teacher who is helping the learner to clarify his or her own understanding of the world (constructivism). In the social constructivist model, the learner is also indirectly enabling others - including the teacher - to reassess *their* understanding. Feedback in this discourse is neither a "gift" from expert to novice (cognitivism), nor a "ping-pong batted backwards and forward" within linear or hierarchical relationships (constructivism); instead, it is constructed through loops of dialogue and information (Askew & Lodge, 2000). As such, feedback is a *process* taking part within a context.

This conceptualisation of feedback as a long-term process of dialogue makes it difficult to define the socio-constructivist perspective on e-learning feedback. The notion of 'dialogue' does not fit with the constraints of self-paced e-learning where feedback is only a one-way communication from the computer to the learner, although a socio-constructivist study could feasibly be made of the influence of e-learning within the wider training and development curriculum. Such a study was not in scope for this research, given its focus on learners' experiences of specific instances of feedback embedded in e-learning applications.

2.3.5 SUMMARY OF THEORETICAL PERSPECTIVES ON THE FUNCTION OF FEEDBACK

The previous section presented four theoretical perspectives on the instructional function of feedback, where each perspective represented one of the four main theories of learning. A summary of the functions of feedback addressed by the four perspectives and is given in figure 3.

Behaviourist	Cognitivist	Constructivist	Socio-constructivist
Reinforce	Explain Inform Correct	Promote reflection Provoke cognitive dissonance	Promote dialogue

Figure 3: Instructional functions of feedback according to the principal theories of learning

There has been some research on programmed feedback (i.e. feedback in self-paced, programmed workbooks or e-learning applications) which maps onto the above schematic. The next section examines the completeness and relevance of this research to an e-learning environment.

2.4 FUNCTION OF PROGRAMMED FEEDBACK WITHIN THE LEARNING PROCESS

Building on the theoretical context outlined in section 2.3, this section focuses on discussions about the function of programmed feedback from the perspective of the four theories of learning previously introduced.

2.4.1 BEHAVIOURIST PERSPECTIVE

It was argued in section 2.3.1 that in the mid-twentieth century, behaviourism provided the dominant theoretical perspective on the function of instructional feedback.

From the mid-1950s through the 1960s the dominant figure in programmed feedback research was B. F. Skinner. Skinner proposed that textbooks, lectures and class-based training offered little opportunity for direct feedback or positive reinforcement. By comparison, he believed that his teaching machines provided direct and immediate feedback giving the learner the necessary cues for positive reinforcement. Skinner's (1968) claim was that "teaching machines were invented to restore these important features of personal instruction".

Skinner pointed out that his teaching machines were not just *testing* machines, such as the original Pressey machine. Skinner's machines (or paper-based workbooks) did not require students to have studied the subject matter beforehand. The instructional strategies involved dividing up a learning task into small pieces, and teaching them in a logical sequence such that it was highly likely that the learner would respond to each micro task correctly (Cohen, 1985, cited in Mory, 1992). With successful responses, feedback provided positive reinforcement and an increased likelihood that the response to that task would be repeated in the future.

> "...in my machine the items were arranged in a special sequence, so that, after completing the material in frame 1, the students were better able to tackle frame 2, and their behaviour became steadily more effective as they passed from frame to frame. I began to speak of 'programmed instruction' (Skinner, 1968)

2.4.2 COGNITIVIST PERSPECTIVE

Section 2.3.2 presented the cognitivist perspective on feedback, and described the theoretical shift towards the premise that the function of feedback was to provide information enabling learners to improve their understanding of the topic.

Much of the research on programmed feedback focused on the role of error-correction, i.e. telling learners the correct response with or without supporting information to explain the root cause of their misconception. In Kulhavy's (1977) review of feedback research he proposed a way of understanding *how* feedback facilitates learning:

> " ...we can say that feedback will have one of two effects on each response that a student makes: (a) to let him know when he is right, and (b) to correct him (or let him correct himself) when he is wrong. ... Within the configuration of information processing, the student and the lesson are viewed as components of a self-regulating control system that has the terminal goal of transferring information from the text to the learner. .... Obviously, if the material studied is unfamiliar or obtuse, seeing feedback should have little effect on criterion performance, since there is no way to relate the new information to what is already known." (Kulhavy, 1977)

The language of this quotation refers to two processes: firstly, based on information-processing assumptions, information is transmitted to learners in the form of external feedback; and secondly, the transmitted information is processed internally by learners, who make sense of it on the basis of prior knowledge. These processes are likened by Kulhavy to the feedback processes within servocontrol systems.

The assumption of much of the early research was that explanatory feedback would correct faulty knowledge. When feedback for an incorrect response gave more than simply the correct answer, it was presumed that *more* information increased the likelihood of learners recognising the reason for their errors and thereby improving their understanding of the topic:

> "The simplest approach is to assume that the more response-relevant information contained in the feedback, the greater the chance that students will be able to discern why they were wrong in the first place. Our general prediction is that complexity and correctability march hand in hand across the pages of an instructional communication". (Kulhavy et al., 1985)

In practice, research studies found that 'more' feedback did not always equal 'more' learning (e.g. Kulhavy, 1985). What was missing from the error-correction explanations of feedback's function was a fuller understanding of the role of the learner, and his or her information requirements.

2.4.3 CONSTRUCTIVIST AND SOCIO-CONSTRUCTIVIST PERSPECTIVES

Section 2.3.3 introduced the constructivist perspective that learning is a process of constructing meaning from one's experience. Section 2.3.4 introduced the qualification implicit in the socio-constructivist perspective that learning is mediated by interactions with members of one's family and socio-cultural communities.

Compared with the prominence of programmed feedback studies during the cognitivist-inspired research programs of the 1970s and 1980s, programmed feedback has been a relatively neglected topic in research programs inspired by constructivist and socio-constructivist perspectives on teaching and learning.

Constructivist perspectives emphasise feedback's ability to provoke cognitive dissonance or prompt reflection in the minds of learners, and in doing so to lead learners to construct their own understandings of the world. These functions of feedback have rarely been investigated in studies of programmed feedback; instead they are more commonly explored in studies of simulations and computerised games which deliver intrinsic, system-generated feedback (e.g. Hall and Cox, 1993; Howie et al., 2000).

Socio-constructivist perspectives, which emphasise the collaborative nature of learning, have brought a new lexicon to the study of learners and learning in which *dialogue* is the critically-important process, rather than the way in which learners receive and interpret one-way, programmed feedback (Baker and Lund, 1997; Koschmann, 1999). The very essence of socio-constructivist perspectives on learning may initially seem to preclude a role for programmed feedback; after all, feedback delivered by a computer cannot be said to be 'social'. However, it is also important to recognise that programmed feedback - and the e-learning applications in which it is embedded - is rarely received in a vacuum. The voice of the training organisation which commissions the e-learning is represented in the instructional content - including the feedback - and so the learner's interaction with the content is part of an ongoing dialogue with the organisation. A related point is made by Clancey, when arguing against too narrow an interpretation of the term 'situated learning'.

> "Situated learning is concerned with how learning occurs everyday... The common idea in the artificial intelligence literature that "situated" means "in a physical setting" or "interactive" grossly distorts the psychological nature of the theory. ... the superficial view that social means "in the presence of other people" (compare to the superficial view that situated means "in some location"), fully distorts the psychological claim". (Clancey, 1995)

Despite the comments above, few studies have investigated programmed feedback from the perspective of socio-constructivist theories of learning.

2.4.4 DISCUSSION REGARDING THE FUNCTION OF PROGRAMMED FEEDBACK

Section 2.4 reviewed the theoretical literature relating to the function of programmed feedback, and identified the extent to which this literature has informed feedback research. The review revealed that relatively few research studies have explored feedback from constructivist or socio-constructivist perspectives, which are the dominant perspectives influencing contemporary educational research and practice.

It was also argued that relatively few studies have investigated feedback's ability to provoke cognitive dissonance or promote reflection - functions which are presumed to facilitate learning according to a constructivist perspective. To investigate such functions would require a rather different methodology from the non-naturalistic experimental traditions prevalent in behaviourist and cognitivist research. Whilst it is impossible to peer into the learner's mind to establish whether feedback promotes reflection or construction of meanings, it *is* possible to investigate learners' accounts of their experiences of feedback, and thereby to infer feedback's impact. An investigative method such as interviews would also enable learners to be questioned about what they themselves expect to be the function of feedback. Given that an understanding of the function of feedback is necessary to inform instructional design, it is proposed that an investigation of learners' expectations of feedback, and of learners' experiences of receiving feedback, would be an important contribution to the literature.

2.5 REVIEW OF PROGRAMMED FEEDBACK RESEARCH

Previous sections have compared the perspectives of the four principal learning theories on the function of feedback. These discussions were largely theoretical. This section complements the theoretical discussions by reviewing prior research on programmed feedback. Much of the prior research was influenced by cognitivist and - to a lesser extent - constructivist perspectives, and examined how the design of feedback influenced the effectiveness of its instructional function.

This section begins by describing two influential models which propose a process by which learners receive, interpret and act on programmed feedback. Section 2.5.2 continues by reviewing the literature on the attributes of feedback which are believed to influence feedback's effectiveness, and section 2.5.3 concludes with a review of methods used in prior research to gauge the effectiveness of research.

2.5.1 PROGRAMMED FEEDBACK MODELS

The models most frequently cited in the literature are those developed by Kulhavy and Stock (1989), and by Bangert-Drowns et al. (1991). The former model decomposed the feedback cycle into the behavioural responses and the internal cognitive responses of the learner. The latter model represented an attempt to identify the state of the learner as he or she receives feedback, and revealed a greater influence from constructivist perspectives on learning than the model by Kulhavy and Stock (1989). Both models were considered significant for this research, and influenced the conceptualisation of business learners' expectations and experiences of feedback, which was the subject of this research.

Feedback models - Kulhavy and Stock

Kulhavy and Stock's (1989) 3-cycle feedback model incorporated the important concepts of *response-certitude* and *discrepancy.* These concepts were used to predict learner behaviours including time-spent-reviewing-feedback, which was assumed to relate closely to the depth of learning taking place in the learner. The model was based upon a number of ideas from servo-control theory, and presumed an instructional activity with multiple choice questions and feedback containing verification and elaboration. Three cycles are depicted in the model, which is depicted in figure 4.

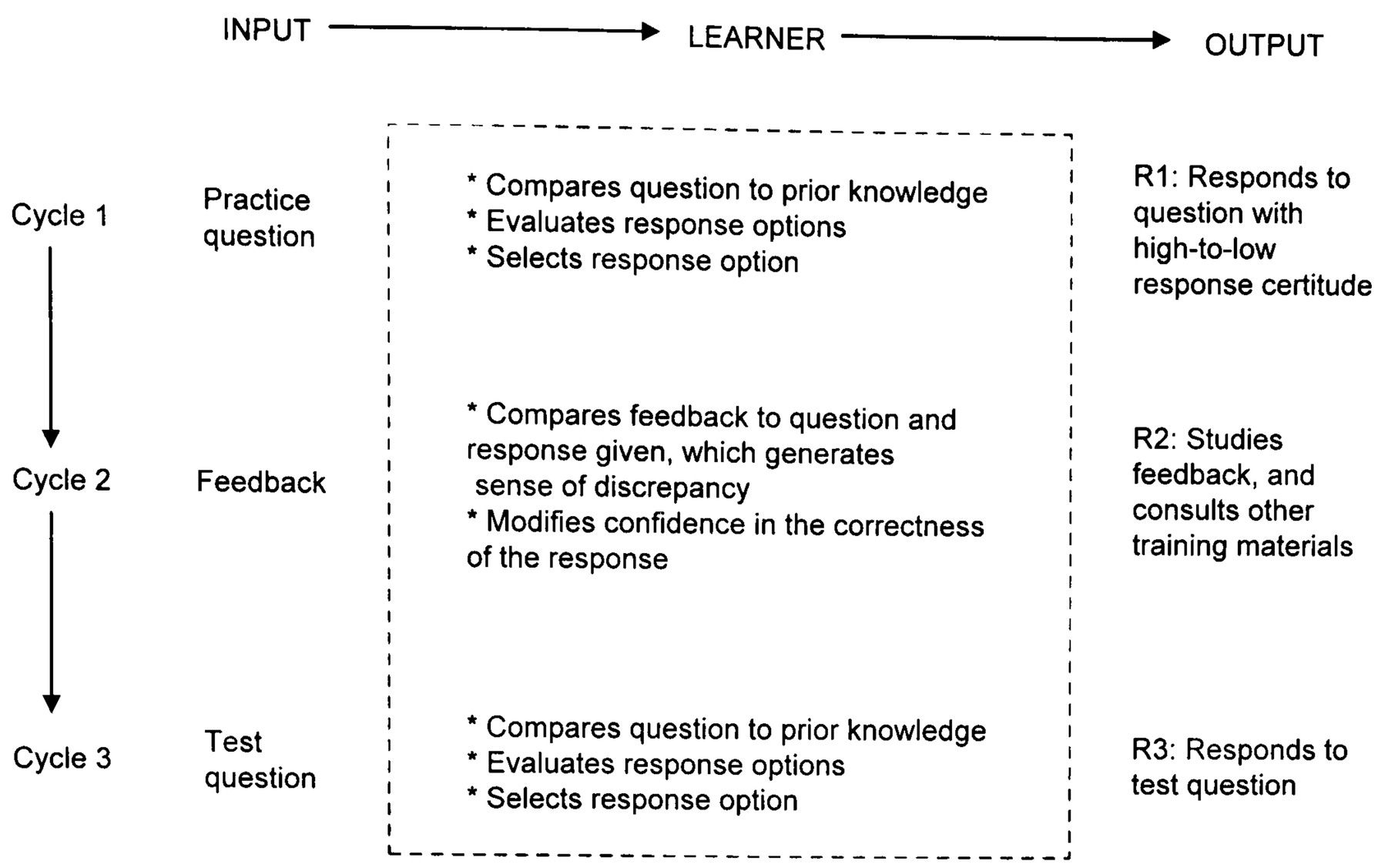


Figure 4: Schematic representation of Kulhavy and Stock's (1989) 3-cycle feedback model, adapted from Mory (1996)

The three cycles of the model are described below.

1. In cycle 1, the learner is presented with a multiple-choice question, which provides practice in preparation for a later test. When considering the task, the learner reflects on prior knowledge before selecting one of the response options. *Response-certitude* is the learner's subjective estimation of whether his or her response is the correct one. It is a fundamental assumption of the model that learners assign some degree of certainty to each response.

2. In cycle 2, the learner receives and reflects on the external feedback message. The verificational component of the feedback is compared with the learner's response certitude and creates a measure of *discrepancy*. The model assumes that the magnitude of discrepancy is directly related to the amount of effort a learner will exert to reduce the likely recurrence of the error. In this model, a proxy measure for effort is the amount of time spent reviewing the feedback. Another assumption is that informational content in the feedback, such as diagnosis to help with error correction, will be used by the learner to modify their knowledge schemata.

3. In cycle 3, the same multiple-choice item as in cycle 1 is presented again – but this time as a test – and the learner responds.

Predictions from the Kulhavy and Stock's 3-cycle model

Three predictions were made by Kulhavy and Stock using this model, all of which revolved around the construct of response certitude.

- The first prediction concerns 'time-on-feedback', a proxy measure of the learners' effort to understand the feedback at point R2. The model predicts that time-on-feedback will correlate with the learner's sense of discrepancy on receiving the feedback. The findings from Kulhavy and Stock's (1989) research confirm this prediction, and they cite further supporting research by Kulhavy et. al. in 1976 and 1979.
- The second prediction is that if discrepancy is high, for example on receiving the statement "incorrect" as feedback when response-certitude had been high, learners will make significant effort to reduce the potential of future discrepancy by modifying their knowledge schemata. This effort is predicted to lead to improved performance in post-instruction tests. The model is less predictive about learners who make errors but who also have low response-certitude. In those situations, it is recognised that learners may have fundamental problems in understanding the task, or may have limited knowledge with which to try to identify the correct response. Those learners may need more instruction, rather than verificational feedback; without it, the probability of performance improvement is low. Research has been inconclusive with regards to the second prediction (Bangert-Drowns et. al., 1991).
- A third prediction was that for low response-certitude responses, comprehensive elaborative feedback should have its greatest effect, since it contains an element of instruction. However, research by Kulhavy et al. (1985) has not found this to be the case. Their results suggest a flaw in the cognitivist view of feedback, which assumes that 'more information is always better'.

This model has been influential in programmed feedback research, and identified important concepts such as discrepancy and response certitude. However, the model does not account for the possibility that learners' responses to feedback may be mediated by other factors, such as their learning orientation and level of interest in the subject matter. Recognising the importance of these factors, this research specifically explored the influence of learners' styles-of-engagement with e-learning applications, and the influence of differences in learners' level-of-expertise.

Feedback models - Bangert-Drowns et al.

An alternative feedback model was proposed by Bangert-Drowns and his associates (1991) which synthesised the findings of previous research on programmed feedback and described the state of the learner as he or she moves through a feedback cycle. The model is presented in figure 5.

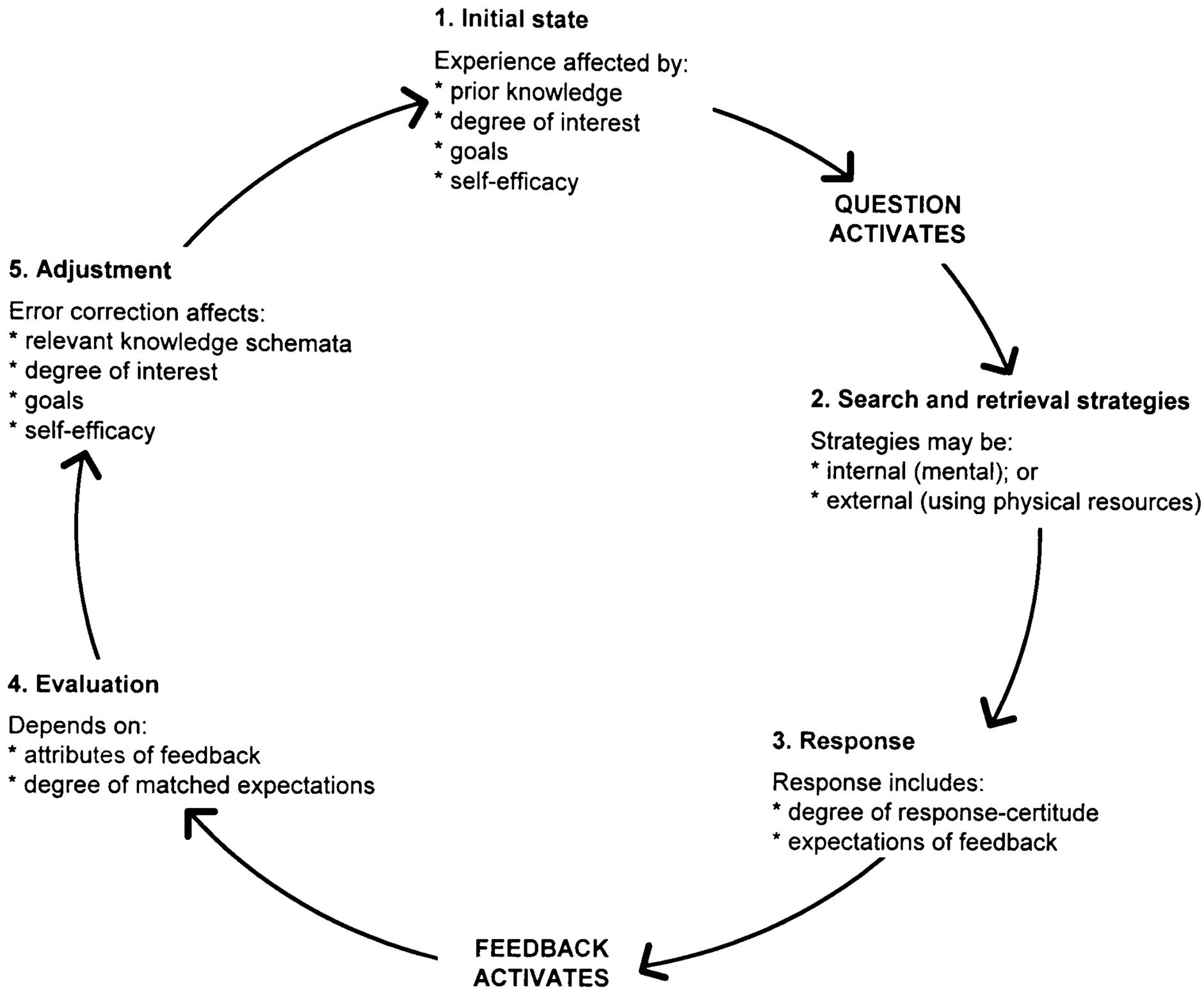


Figure 5: The state of the learner receiving feedback, based on Bangert-Drowns et al., (1991), adapted from Dempsey, Driscoll and Swindell (1993: 40)

This model is useful as a heuristic tool to prompt questions about learners' expectations and responses to feedback, and builds on Kulhavy and Stock's (1989) model by incorporating the construct of response-certitude. The Bangert-Drowns model makes an important contribution by incorporating the construct of "mindfulness", defined as "the volitional, metacognitively-guided employment of non-automatic, usually effort-demanding processes" (Salomon & Globerson, 1987). The model emphasises that feedback can promote learning if received mindfully, but that feedback can also inhibit learning if it encourages mindlessness, for example if the feedback is perceived as simplistic or redundant (Mory, 1996).

Discussion of the utility of the feedback models

The feedback models and the constructs they propose represented a radical shift away from the behaviourist emphasis on learners' observed behaviour. As an alternative, and in the spirit of the cognitivist emphasis on the mind, these models identified the importance of understanding learners' expectations of feedback, and their attempt to make sense of it in order to develop their knowledge schemata. Influencing variables such as the learners' mindfulness, their response-certitude on responding to the task, and their sense of discrepancy on receiving feedback were also important elements of the models.

Both models were influential in the development of research questions which framed this research, and in the interpretation of findings. Kulhavy and Stock's (1989) model was influential in proposing the importance of learners' sense of discrepancy on receiving feedback. However, as shown in chapters 7 and 8 (sections 7.5.6 and 8.7), findings indicated that discrepancy did not necessarily lead to belief-change. The model by Bangert-Drowns et al. (1991) was influential in its portrayal of the importance of mindful engagement, and of the process by which learners' expectations and goals are matched with learners' evaluation of the feedback to produce what Bangert-Drowns et al. call "adjustment".

The prediction from Kulhavy and Stock's model that the provision of more information in feedback necessarily leads to more learning has not been supported (Mory, 1992, 1996), and no research is known to have tested the model proposed by Bangert-Drowns and his colleagues. Furthermore, both models are deficient in that neither explains the impact of variations in feedback's *elaborative* attributes (which relate to the non-verificational and content-related aspects of feedback). This means that neither model provides a heuristic tool which can inform the instructional design of feedback. The lack of research categorising the elaborative attributes of feedback has been recognised as an important omission in the feedback literature (Kulhavy & Stock, 1989; Mory, 1996). In recognition of this omission, this research investigated the influence of feedback's elaborative attributes on learners' responses to feedback, as well as learners' assessment of the extent to which feedback matched their expectations.

Although not explicitly incorporated into the models reviewed above, a considerable amount of research has investigated the influence of feedback's attributes on learning. A review of this research is given in the next section.

2.5.2 ATTRIBUTES OF FEEDBACK

A review of the research conducted in the 1970s and 1980s indicates convergence on a three-part categorisation of feedback's attributes: timing; type; and information load. *Timing* refers to whether feedback is immediate or delayed. *Type* is sub-categorised as *verification* (indicating whether the learners' response is correct or incorrect) or *elaboration* (consisting of content-related information). *Load* is defined as the total amount of information contained in the feedback message. Research on the instructional function of feedback, which can also be described as an attribute of feedback, was discussed in section 2.4. In recent years, the impact of using different types of *media* to deliver the feedback has also been investigated.

In this section, research findings relating to the attributes of timing, type, load and media are reviewed. Load, timing, verificational type and media are classified in this research as 'structural' attributes of feedback, since they do not relate to its substantive content. The term 'elaborative' attributes is reserved for the different forms of feedback elaboration such as the type of instruction (e.g. explanation or provision of an example), or the focus of the content (such as problem *solution*, or the *process* of arriving at that solution). As will be seen from the following review, very little attention has been given to the impact of feedback's elaborative attributes. This is recognised as a major omission in the literature (Mory, 1992; Kulhavy & Stock, 1989), and it is an aim of this research to make a contribution to this area. Findings pertaining to feedback's elaborative attributes are discussed in Part 4 of this thesis.

In the final part of this section, it is argued that the *source* of feedback (and the credibility of that source) may also be an important influence on feedback's effectiveness. There is little research on this attribute with respect to programmed feedback; therefore, relevant research findings are reported from the field of organisational behaviour on page 44.

Timing

'Timing' has been interpreted as essentially a dichotomous variable; research has therefore investigated whether feedback should be given immediately, or delayed. The logical answer from the perspective of information-processing theories is that feedback should be given immediately. This is because whilst the task and relevant prior knowledge are still active in the learner's mind, any new information given in the feedback is received into working memory and can be compared with prior knowledge. In doing so, learners can examine any discrepancy, and modify their knowledge schemata accordingly. Immediate feedback also has the advantage that it decreases the time spent floundering, enables the learner to focus on relevant information, and decreases time-on-task (Anderson et al., 1989)

The benefits of immediate feedback may seem obvious, but some research has shown that the interaction of timing with other attributes of the task can produce unintended and undesirable outcomes. For example, research on the effectiveness of intelligent tutoring systems found an interaction between feedback's timing and the task's cognitive load (i.e. complexity). The findings suggested that immediate feedback, received at each step of a multi-step instructional exercise, was confusing for learners, and that delayed feedback might be more effective (Schooler & Anderson, 1990; Sweller et al., 1988).

Kulhavy, in his review of feedback timing research in 1977, proposed a contrary argument that delayed feedback was more effective in certain conditions. He explained this proposition by reference to what he called the "delay-retention effect'". However, this proposition has received little support from empirical evidence. For example, in an important meta-analysis of research on feedback timing, Kulik and Kulik (1986) found that delayed feedback was effective only in somewhat contrived situations such as those which emphasised rote memorisation. In tasks that presented greater cognitive demands, such as problem-solving, immediate feedback was more successful than delayed feedback in helping learners.

Feedback type: Verification

The purpose of verification is to advise the learner whether they are correct or incorrect. The cognitivist and constructivist assumption is that learners cannot begin to diagnose and correct an error until they detect it (Mory, 1992), prompted either by explicit, verificational feedback, or following a process of self-assessment. The possibilities for verificational feedback in e-learning applications depend on whether instructional tasks are closed or open:

- For multiple-choice and other closed-question tasks which require learners to select one of a number of response options, the feedback research literature differentiates between three types of verification: KR (Knowledge of Results, i.e. "correct" or "incorrect"), KCR (Knowledge of Correct Response, i.e. a statement of the correct response), and AUC (Answer Until Correct, which is self-explanatory).
- For open-question tasks which require the construction of a short essay, the definition of assessment criteria has been - and will probably continue to be - problematic (e.g. Rowntree, 1987) because an open question rarely has a single correct answer. As a consequence there are many ways in which to offer (quasi-) verificational feedback. The underlying problem concerning the design of e-learning feedback is partly a practical limitation: in spite of considerable work on natural language processing, the computer's ability to understand, interpret and then assess a learner's essay response remains very limited. Techniques which attempt to assess essay responses usually rely on keyword analysis. For example, in Brady's (1993) study, each essay was compared with a list of expected keywords which were defined by the instructional designer and subject experts. The higher the number of keywords used in the learner's essay, the higher the attribution of response correctness. The problem of assessing essay responses has also received considerable attention in recent research on Computer Assisted Assessment (e.g. Mason & Grove-Stephenson, 2002; Mitchell et al., 2002; Moreale et al., 2002; Burstein et al., 2001; Callear et al., 2001), but has not yet generated convergence on how best to assess learners' constructed responses, nor on how to give feedback.

For multiple-choice type tasks, research findings indicate that *some* feedback is better than *no* feedback (e.g. see Azevedo & Bernard, 1995, and the studies cited in Clariana et. al., 1991). The meta-analysis by Bangert-Drowns et. al. (1991) showed that when feedback merely indicated that a response was correct or incorrect (i.e. KR), it was less likely to lead to improvements in tests than when the feedback in some way informed the learner of the correct answer (i.e. KCR).

For open questions, few studies have compared the effectiveness of different forms of verificational feedback. Instead, studies using open questions have usually offered learners only one option - that of receiving model-answer feedback (e.g. Laurillard, 1998; MacDonald, 2001) - which is a form of elaborative, not verificational feedback.

Few studies have investigated how learners respond to being offered only model-answer feedback, or whether alternative forms of non-verificational feedback would be perceived by learners as more useful to their learning process. This is an important omission in the literature, and one which is investigated in this research.

Feedback type: Elaboration

The elaborative component of feedback consists of content-related information contained in feedback message, and is generally presumed to follow verification, although not all feedback has an elaborative component.

Kozma and Bangert-Drowns (1987) distinguished elaborative feedback by its type of operation: error correction; presentation of prototypical responses; display of the consequences of feedback; and explanation of the appropriateness of responses. This is an interesting categorisation because it attempts to identify different instructional styles of feedback, and because it gives feedback more than merely an explanatory function. Other categorisations have been proposed (e.g. see Danielson, 1996; and Silverman, 1992; cited in Latham, 1997), but are less useful, either because they do not relate specifically to programmed feedback, or because they go no further than list to attributes which all instructional feedback should ideally have. The categorisation used in this section is the one proposed by Kulhavy and Stock (1989), and which distinguished between three types of elaboration:

- task-specific (e.g. restatement of the correct answer);
- instruction-based (e.g. an explanation based on the original instructional material); and
- extra-instructional (e.g. additional information such as new examples which were not present in the original instruction).

Mory (1992, 1996) argues that the general picture as regards elaborative feedback research is that the number of studies is small, and the findings are inconsistent: research on *task-specific* feedback, which has generally manipulated the variables of question-structure and information load, has produced contradictory results; results from studies using *instruction-based* elaborations have been even less consistent; and few studies have systematically investigated *extra-instructional* feedback (see also Kulhavy & Stock, 1989; and Schimmel, 1983).

A possible reason for these inconsistencies is that few studies have investigated the impact of intervening variables such as learners' individual differences, or differences in the instructional context (Kulhavy & Wager, 1993). For example, one variable which has been implicated but not fully explored is 'seriousness of error', a construct developed by Tatsuoka and her colleagues in relation to complex learning tasks (cited in Kulhavy & Stock, 1989). The seriousness of instructional errors committed by learners was analysed using learners' pre-instruction test results, and the data was then used to assess the effectiveness of additive feedback elaborations on learners' performance on a later test. Birenbaum and Tatsuoka (1987, cited in Kulhavy & Stock, 1989) used this method and found that an increase in the information content of feedback resulted in a greater probability of *non-serious* errors being corrected, but had little

effect on correction of *serious* errors. The finding suggests that more complex errors or misunderstandings may require more comprehensive feedback elaborations.

Another possible reason for the inconsistent results is that differences in the elaborative attributes of feedback have not been adequately categorised. This has created difficulties when attempting systematically to compare research findings. This is an important omission in the feedback literature, and one which prompted the current research to categorise the elaborative attributes of feedback from the perspective of the sample of learners studied.

Load

The construct of *load* 'has been defined as "the total amount of information contained in the feedback message" (Kulhavy & Stock, 1989: 287). Load is minimal when feedback is simply 'yes/no' or 'correct/incorrect', and increases when new information is added. There has been no systematic attempt to define a matrix for adding or subtracting feedback information, and so only subjective assessments of feedback load have been used in research studies.

Investigations into the effectiveness of manipulating load were undertaken in the 1970s and 1980s, but slowed when findings raised doubts about the assumption that increases in information load always increase feedback's effectiveness. As suggested in the previous section, findings indicated that 'information' is too complex a concept to be interpreted objectively, because differences in the way information is presented (i.e. its elaborative attributes) influence the way learners interpret or understand it. One implication is that a more fruitful line of research may be to differentiate feedback in terms of its elaborative attributes, which was the approach adopted in this research.

Media

As the multimedia capabilities of e-learning applications have developed, there have been lively debates about the influence of media on the learning process. An important challenge was raised by Clark (1983, cited in Kozma, 1991; 1994) when he asserted that

> "...media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition." (Clark, 1983: 445)

He went on to challenge researchers to prove that media influences learning, and to develop a theory to explain the process. Clark's challenge was taken up by Kozma (e.g. 1991) and others. In the field of programmed feedback research, the number of studies looking specifically at the effect of media is small but growing. These studies are reviewed in the remainder of this section together with related but more general research on the influence of media on learning.

Lalley (1998) compared the use of two forms of media feedback - (1) video + audio speech, and (2) visual text - in a school biology e-learning application. He found that feedback combining video and speech resulted in superior learning and retention.

Lalley argued that this result arose because the video feedback - containing images and speech - stimulated both the visual and verbal systems. However, two alternative reasons for the effectiveness of video feedback have been proposed in the literature. The first is that that visual information possibly contains *more* information, and is "bushier" than text (Baggett, 1989, cited in Kozma, 1991). The second reason is that video with audio speech is dynamic, and can show sequences of events and processes in a way which is impossible with static text (Kozma, 1991).

Others researchers have suggested that the transient nature of video and speech is not always useful. Text can be reviewed repeatedly during reading, whereas the nature of video and audio speech is that there is no opportunity to review the sequence without disruption - for example by laboriously replaying the entire tape (Kalyuga et. al., 1999). In Lalley's study (1998), comments from students also pointed to difficulty with the transiency of video and speech; for example "you can review the text; video you can review only once". Kozma (1991) suggested that the stability of visual text may be particularly important for novices. His comments below about text instruction may also apply to text feedback of the type studied in this research:

> "Readers will slow their rate for a passage on a difficult or novel topic, when they encounter information within a passage that is particularly important to the meaning of the text, or when they must integrate less well-organized sentences into macropropositions. All of these are examples of how readers use the stability of the symbols system in books to slow their rate of progression or even to regress over text in a way that would seem difficult or impossible to do with audiotape's ever-advancing presentation of information". (Kozma, 1991: 184)

Kozma (1991) further argued that experts may gain more from text rather than audio because, being very knowledgeable about the subject matter, they can process information more quickly and strategically, going back and forth over the text, in a manner which is impossible with the linear nature of audio.

Prior research also suggests that variations in media may influence learners' levels of motivation and interest. In Lalley's study, a significant number of students preferred video feedback to text feedback. Several students explained that video was inherently more interesting than text. However, a contrary preference was found in the study by Rieber et al. (1996) which compared learners' perceptions of graphical or text feedback in an e-learning application teaching Newton's laws of motion. Initially, the graphical feedback was strongly preferred by all learners. Gradually, as they deepened their understanding, they preferred textual feedback. The researchers concluded that the learners became bored with the graphics, and wanted the challenge of the text feedback which gave more detailed and concrete information.

Differences in learners' orientation to media were also identified by Salomon (1984) during a study which compared children either watching educational TV or reading educational texts. To explain his findings, he developed the construct of *amount-of-invested-mental-effort*, or 'AIME'. Salomon argued that AIME accounted for an apparent correlation between what the children viewed (TV or text) and their depth of comprehension. He suggested that learners' attitude to TV or text influenced their expectations about the amount of mental effort typically required to process a medium's message. For example, he found that some learners 'switched off' when

watching educational TV and seemed to associate TV with passive entertainment rather than effortful learning. Lalley's feedback study, introduced above, echoed this view:

> "The other [student] comment of note was that 'having to read it makes you pay attention'. The implication of this comment is that video may be construed as allowing students to be more passive in their learning than text, because video is played to them, while they must actively engage text". (Lalley, 1998)

The review of media research presented in this section indicated that different forms of media impact upon learners' experiences of feedback, and have an influence on learners' motivations and level of engagement (i.e. passive or active). The influence of media was further explored in this research: comparisons were made between learners' experiences of text and video feedback; and relationships were identified between media and learners' engagement with e-learning applications (e.g. see section 7.2.3 on learners' sense of participation; section 7.3 on learners' styles-of-engagement with e-learning, and section 7.5 on learners' outcomes on receiving feedback).

Source

Empirical literature exists on the importance of feedback source, but relates to organisational behaviour and job performance, rather than e-learning feedback. Nevertheless, it is referenced here because the findings may be relevant to an understanding of business learners' responses to feedback .

In the organisational behaviour literature, feedback source has been identified as a likely influence on the way a learner accepts the credibility of a feedback message. Ilgen et al (1979, cited in Northcraft & Earley, 1989) suggested that the amount of credibility which learners attach to the content of the message may influence the extent to which feedback is attended to and utilised. An implication from these findings in that e-learning feedback originating from different sources may be perceived differently by learners.

The lack of research on the impact of source is an important omission in the e-learning feedback literature. Although a comparison between different feedback sources was not a feature of this research, findings did indicate that learners' perceptions of feedback's credibility influenced their interpretation and acceptance of it. This aspect of feedback is discussed in chapters 7 and 8.

Mediating variables

The influence of mediating variables have received relatively little attention in the programmed feedback literature. For example, the influence of variations in *task* characteristics has rarely been explored in depth, and only a limited number of studies have manipulated both task and feedback characteristics (e.g. see Andre & Thieman, 1988).

Two mediating variables which are believed to have a potential impact on feedback effectiveness are learning objectives (e.g. to learn facts, or develop skills), and individual learner differences.

Mory's (1992) review of the feedback literature analysed the impact of learning objectives on the effectiveness of feedback, but found that the studies were inconclusive. She also commented that there were few studies where the learning objectives aimed at developing learners' problem-solving skills. This research, however, focuses on feedback's role in applications aimed at developing problem-solving skills in a business environment.

Few research studies have systematically investigated the influence of individual learner differences on the effectiveness of feedback, and this is recognised as a major omission in the literature (Kulhavy & Wager, 1993). Sales (1993) has raised concerns that few e-learning applications contain adaptive feedback which uses information about the learner to generate appropriate feedback messages. His concern is not that e-learning applications should be replaced by intelligent tutoring systems, but that available information such as the learner's ability or aptitude could be used by simple computerised routines to provide pre-programmed, adaptive feedback.

In order to make a contribution to this area, this research investigated the influence of one independent variable - that of learners' level-of-expertise. The importance of expertise on an individual's problem-solving skills, and on their learning process, is discussed in section 2.6 of this chapter and in section 3.4 of the methodology chapter.

2.5.3 METHODOLOGIES TO ASSESS FEEDBACK EFFECTIVENESS

Many of the prior research studies on e-learning feedback, especially those of the 1970s and 1980s, used experimental methodologies which relied on proxy measures of learning to assess feedback's effectiveness. A common experimental design of the time comprised three steps: (1) a pre-instructional test; (2) a battery of tasks with instructional feedback; and (3) a post-instructional test. The effectiveness of the instructional feedback in step (2) was inferred by comparing the learner's results in the pre- and post-instructional tests. This was a rather crude measure which assumed that learning could be inferred from test performance. The performance-measurement approach required the use of a battery of multiple-choice questions ('MCQs') which could be easily marked. One of the problems with this approach is that whilst MCQs may be adequate for rote learning tasks involving a discrete number of facts or knowledge which can be codified, they are less appropriate for complex subjects and learning objectives.

Other studies have used human-computer-interaction ('HCI') measures as proxies for feedback effectiveness. For example, time-on-feedback is a measure of the time a learner spends reading feedback before moving on to the next piece of instruction. Time-on-feedback was used in research by Kulhavy and Stock (1989) using their three-cycle model of feedback, and has been discussed in section 2.5.1. The presumption was that the longer learners spent reading feedback, the deeper the level at which they were mentally processing the information and therefore the more useful it was.

A problem with performance measures such as those described above is that they do not necessarily reflect the degree or quality of learning which has occurred. The uncomfortable

truth is that what Goodman (1998) has called "true learning" is difficult to operationalise in a meaningful way. Furthermore, efforts to do so - using performance measures as proxies - may give a false sense of confidence about the 'success' or otherwise of an e-learning application and the feedback contained therein. An alternative research approach is to consider the subjective experience of the learners themselves, as they reflect on their process of engaging with training. Whilst learners' comments are still no measure of learning, they do provide insights into learners' perceptions of the effectiveness of training. An investigation of learners' subjective perceptions of feedback's effectiveness received little attention until fairly recently. Two studies which have investigated learners' experiences are discussed next.

The work by Rieber et al. (1996) is one example where quantitative data was complemented by qualitative data and analysis. In their study of graphical and textual feedback during a computer simulation, a grounded theory approach was used, based on unstructured interviews. The aim of the interviews was to encourage learners to describe their thought processes as they interacted with the simulation. This method enabled the researchers to identify the importance of specific aspects of the learner-to-content interaction, such as the role of the supervising instructor, which would probably have been overlooked if only performance measures or a questionnaire survey had been used.

Roberts (1996) is another example of research using qualitative data (from semi-structured interviews) to explore learners' perceptions of feedback. In this case, students of the British Open University were asked for comments about two forms of feedback: tutors' written comments on assessments, and computer-marked assessment feedback. Most of the interview questions revolved around the tutor-given feedback rather than the computer feedback, and so the findings are not directly relevant to this thesis; nevertheless, the study is important because it is indicative of a shift in research focus towards the subjective perceptions of the learner.

The two studies cited above represent part of a broader trend towards qualitative, interpretive research in the field of e-learning. However, much of the recent work has focused on collaborative forms of learning such as on-line conferencing as opposed to self-paced e-learning. The lack of qualitative research exploring learners' experiences of feedback in self-paced e-learning applications is an important omission in the feedback literature, and is addressed in this research.

2.6 PROBLEM-SOLVING

This section reviews the literature on the development of problem-solving expertise, in order to identify implications for business e-learning and in particular, the design of e-learning feedback.

Problem-solving has been defined as "cognitive processing directed at achieving a goal when no solution method is immediately obvious to the problem solver" (Mayer, 1992, quoted in Mayer & Wittrock, 1996). As a focus of research, problem-solving has received considerable attention within the discipline of cognitive psychology (e.g. see Sternberg & Frensch, 1991, and literature reviews in texts such as Eysenck & Keane, 1995), and has received some attention in the literature on management learning (e.g. see Burgoyne & Reynolds, 1997). However, prior research on the development of the cognitive *skill* of problem-solving has tended to remain within the domain of cognitive psychology. Therefore, section 2.6.1 draws mainly from problem-solving research conducted within the domain of cognitive psychology. When presenting this review, the focus is on research which has implications for training design. Implications include the importance of practice in order to automate problem-solving thinking processes, and the importance of authentic experiences set in real-world or simulated environments. Finally, in section 2.6.2, specific implications for the design of instructional feedback are drawn out from the literature on ill-structured problem-solving.

2.6.1 THE NATURE OF PROBLEM-SOLVING

Prior research on the development of a universal theory of problem-solving

The nature of problem-solving has received considerable attention in the field of cognitive psychology. Research studies in the 1970s, somewhat ambitiously, sought to develop a universal theory of problem-solving which could solve problems across multiple situations and multiple domains. This quest was exemplified in Newell and Simon's (1972, cited in Chi & Glaser, 1988) development of the General Problem Solver computer program, which was based on means-ends problem-solving strategies. Their aim, and those of other cognitive scientists at that time, was to distill problems into a small set of categories, identify the strategies used by successful problem-solvers, and then teach those strategies to students (Kahney, 1993).

Differentiating between well-structured and ill-structured problems

It soon became apparent that the goal of identifying a small number of universally-applicable problem-solving strategies was unattainable. The variability of problems meant that no single set of problem-solving strategies could solve them all. As research progressed, cognitive scientists began to distinguish between "well-structured" problems, which *were* amenable to logical problem-solving routines which could be codified and taught using didactic methods, and "ill-structured problems", which were not so amenable. In a business setting, both types of problems occur, and similarly require different problem-solving skills.

In a review of business problem-solving, Simon (1977) defined well-structured problems as those involving regularly-occurring decisions and problems which, in an organisational context, could be solved by reference to standard operating procedures. Ill-structured problems were described as "non-programmable" to the extent that they were novel, unstructured and important. An ill-structured problem could not be solved solely with standardised procedures for one of three reasons: because the problem had not arisen before; because its precise nature and structure were elusive or complex; or because it was so important that it deserved a custom-tailored treatment. Simon (1977) suggested that problem-solving strategies for ill-structured problems rely on judgement, intuition and creativity.

The importance of tacit knowledge

Alongside the growing appreciating of the ill-structured nature of many problems, research in the field of organisational behaviour began to question the rationalist assumption that managers use logical, conscious approaches to problem-solving (e.g. see historical review of these changing assumptions in Wagner, 1991). Empirical research, based upon observations of how experts solved problems in practice, suggested that the process of problem-solving was more creative and intuitive, and not necessarily consciously understood by the problem-solver (e.g. Mintzberg, 1987).

In recognition of this earlier research, contemporary accounts of business problem-solving now give more credence to the importance of tacit knowledge, and to ways of knowing and doing that cannot necessarily be articulated and codified into a set of rules and procedures (Boisot, 1995; Wagner, 1991; Sparrow, 1998). The literature now gives more emphasis to the importance of intuition, and to the importance of attending to the results of one's unconscious thinking processes as they manifest themselves in bodily signals (Hayashi, 2001).

> "Over the years, various management studies have found that executives routinely rely on their intuitions to solve complex problems when logical methods (such as cost-benefit analysis) simply won't do" (Hayashi, 2001)

Novice-expert differences in problem representation

There is also some convergence in the literature towards the notion that the skills of problem-solving relies to an important extent on the ability to *represent* the problem in ways which facilitate categorisation and identification of solutions.

This proposition is supported by several research studies which compared the ways in which novices and experts represented and then solved problems. For example, in the domain of physics, Chi et al. (1981) found that experts classified problems according to the underlying principles of physics, which gave them a greater probability of solving them correctly. Novices, on the other hand, classified physics problems on the basis of superficially-similar characteristics, which did not greatly help their problem-solving ability. This shift in classification method from one involving simple features to one involving more complex, principled features has been found in a number of domains including political science, computer programming,

chess, maths and medical diagnosis (Anderson, 2000: 298; de Groot, 1965, 1966; Chase & Simon, 1973; Voss & Post, 1988).

Research indicated that by learning to classify problems in different ways, experts also learn to quickly perceive patterns of information which indicate the presence of those problems. Experts become attuned to seeing particular patterns in the environment because in the past, those patterns have produced significant consequences. The importance of pattern recognition is acknowledged in the literature on business problem-solving as well as in the field of cognitive psychology. As a recent article in Harvard Business Review suggests:

> "According to (Herbert Simon), even extremely sophisticated processes, such as a CEO's deciding whether to acquire a company, can in principle be broken into patterns and rules. 'We've been working on expertise of one kind or another since the early 1970s', says Simon, 'and wherever we've turned, we found that what distinguishes experts is that they have very good encyclopaedias that are indexed, and pattern recognition is that index' " (Hayashi, 2001: 63)

As the above quotation suggests, the ability to index the various attributes of problems is important: when faced with a new problem, experts can recall analogous problems using their mental index, and employ analogy-based reasoning strategies to identify potential solutions to the current problem. The importance of indexing problems, experiences and stories has also been identified in the work of Schank and others in cognitive processes they call "Case-Based Reasoning" (Riesbeck & Schank, 1989; Edelson, 1993; Khan & Yip, 1996).

Hayashi (2001) makes a further point: that experts differentiate themselves from merely-competent decision-makers by their consistent efforts to revisit the effectiveness of their decisions and problem solutions by searching for feedback, and by thereby learning from any mistakes. This post-decision reflection has parallels with Schon's (1983) advocacy of reflection-ON-action.

Novice-expert differences in knowledge organisation

Alongside this research on the importance of pattern recognition and indexing of experiences, cognitive scientists have investigated apparent differences in the ways novices and experts organise and structure their knowledge. The construct commonly used to describe such mental knowledge structures is the 'schema', which has been described as the "primary meaning and processing unit of the human information-processing system" (Rumelhart & Norman, 1978: 41). Research on schema theory was particularly active in the 1970s and 1980, as researchers tried to understand the process by which novices transformed their schemata in ways which made their attempts at problem-solving more effective. The seminal paper by Rumelhart and Norman (1978) proposed three ways in which learning (which they define in terms of schemata-development) may occur: accretion; tuning; and restructuring.

- Accretion is the matching of new information with the existing schemata; the new information is added to the database of knowledge, but according to the principles already contained in the schemata.

- Tuning involves the modification of schemata, for example to improve generalisability or specialisation, but without changing the relational structure of the schemata.
- Restructuring occurs when new information does not fit existing schema, and provokes some degree of cognitive dissonance which indicates the need for schema-change.

It has been suggested that schemata support problem-solvers in several ways; for example, by suggesting cues to look for, and issues to consider (Driscoll, 2000). There is evidence that in their areas of expertise, experts have well-developed schemata containing specific problem-solving strategies, but that novices have to rely only on generalised problem-solving strategies such as means-ends analysis, which are usually less effective (see review in Driscoll, 2000: 136). There is also a growing recognition that whilst schemata are useful in the specific context in which they were developed, they do not necessarily transfer well to new contexts with different cultural norms (Detterman & Sternberg, 1996). The implication is that schemata need to be developed in the context in which they will be used.

The importance of deliberate practice

An important finding from the research on experts is that the development of expertise requires a considerable amount of deliberate practice, so that experts develop well-developed schemata and become attuned to seeing important patterns in data relating to their environment (Dreyfus & Dreyfus, 1986). In their study of the development of skills in solving ill-structured problems, Dreyfus and Dreyfus (1986: 19) found that "a person usually passes through at least five stages of qualitatively different perceptions of the task and/or mode of decision-making as his skill improves". They labelled the five skill-levels as *novice, advanced beginner, competent, proficient* and *expert*; and argued that expertise developed through practice and experience, which required time. The importance of time has also been shown in studies of acknowledged geniuses in several fields such as music, science and chess, all of which found that geniuses had a foundation of at least ten years of practice before being acclaimed as such (Hayes, 1985, quoted in Anderson, 2000).

However, 'time' is not sufficient in itself to explain expertise. Etelapelto (2000), studying expert designers of information systems, suggested that what was important was not solely the duration of designers' work experience, but also the specific nature of their practical work contexts, and their functional roles within their work organisations. His studies support the argument of others that practice *in context* is what is important. Learners cannot tune their problem-solving skills unless they are practised in a context which will give authentic feedback.

However, such real-life contexts are not always available or desirable as situations in which to practice one's skills. Mistakes can be expensive and dangerous, or may have unforeseen and undesirable consequences. For this reason, practice in safer environments is often desirable. For business problem-solvers, practice opportunities have traditionally been created in the classroom as well as through the use of technology. For example, class-based training use

role-plays and case-study methods (Wagner, 1991; Barnes et al., 1994) to model aspects of real-life problem-solving which can then be discussed by class participants. Technology-based training offers alternatives including business games (e.g. Hall & Cox, 1993), simulations which model business processes such as the "Beer Game" developed at MIT, and scenario-based e-learning tutorials - all of which give learners practice in multiple business problems.

2.6.2 IMPLICATIONS FOR DESIGN OF PROGRAMMED FEEDBACK

A review of the literature on the development of problem-solving expertise suggests that the *practice* of problem-solving in relevant contexts is particularly important. Practice, supported by formal training, helps learners in four main ways. Firstly, learners develop mental schemata to organise and index their knowledge and experiences of problem-solving situations; secondly, learners develop their perceptual ability to identify patterns in the environment and other ways of 'reading' the problem situation; thirdly, learners practice their reasoning strategies; fourthly, learners practice the real-life behaviours which they believe are appropriate to resolve the problem. E-learning applications can potentially support learners in all but the fourth form of practice.

The literature on problem-solving is less informative about the specific role which feedback can play in developing learners' expertise. Where there is discussion, the consensus seems to be that feedback should relate to learners' *process* of trying to resolve the problem. For example, in Jonassen's (1997) instructional model, feedback is accorded the following role:

> "Feedback should constitute more than simple knowledge of results (correct/incorrect) or correct answer feedback. In addition to appraising the learners of their correctness, it is important, if their answers are incorrect, to determine whether the problem-solving process went wrong and provide either coaching or the correct solution process from that point in the problem ..." (Jonassen, 1997)

Jonassen goes on to acknowledge the difficulty of designing feedback for ill-structured problems where there is – by definition – no universally correct answer. He suggests that in most cases, solutions can be assessed only in terms of their *viability*, and the extent to which learners can articulate and defend their solution. An emphasis on assessing the viability of a solution presents considerable pedagogic difficulties for e-learning applications. Kulhavy and Wager (1993) make the point that:

> "Learners may be asked to evaluate whether given solutions are correct. Such decisions can be easily judged by a computer. However, if learners are asked to explain their reasoning, a method that we recommend, then most interactive systems may be unable to assess their explanation". (Kulhavy & Wager, 1993)

The fundamental problem is that e-learning applications do not possess the intelligence to assess learners' defence of their proposed solutions. Two alternative teaching strategies are commonly used in scenario-based e-learning applications. The first is to use multiple-choice questions asking learners to select the 'correct' solution, followed by feedback which verifies the learners' response and then gives an explanation for the correct answer. The second is to use open-questions to prompt learners to construct their own solution or to explicate their problem-

solving process, followed by feedback which provides a model answer (Kulhavy & Wager, 1993). No research studies are known to have compared these alternatives in the context of e-learning applications. Therefore, this research investigated both types of feedback.

2.7 CONCLUDING REMARKS

This chapter reviewed the theoretical and empirical literature on programmed feedback and the development of problem-solving skills.

The review of the literature on programmed feedback research identified common themes and areas of convergence, as well as areas where findings have been inconsistent or contradictory. The review also indicated important omissions in the literature.

The review of the literature on problem-solving showed that whilst research has indicated ways in which problem-solvers develop their expertise, few studies have examined the effectiveness of different forms of feedback in e-learning applications designed to help learners develop that expertise. Yet, as indicated in chapter 1, many organisations are now transferring parts of their class-delivered curricula to an e-learning format. This is creating an important gap between academic research and business practice.

The main theoretical, empirical and methodological gaps which influenced the design of this research are summarised below.

- ***Theoretical***: In the educational literature, the four main perspectives on the process of learning - behaviourist, cognitivist, constructivist, and socio-constructivist - suggest alternative explanations for the function of feedback in the process of learning. However, it was argued in this chapter that the constructivist and socio-constructivist perspectives - which dominate contemporary educational debate - are less explicit on the specific function of e-learning feedback in self-paced applications. Furthermore, these perspectives do not provide sufficient practical guidance for instructional designers trying to create effective e-learning feedback. Under these circumstances, it is not surprising that much of the literature on the effectiveness of feedback has been contradictory and confused (Mory, 1992, 1996). An important implication is that a better understanding of the function of e-learning feedback is needed.

- ***Empirical***: The literature review identified that much of the prior feedback research studied children or college students who were completing tasks involving knowledge acquisition or the application of simple rules. No studies were found which investigated adult learners completing tasks in self-paced e-learning applications to develop their business problem-solving skills. The literature review also identified that although several models have been proposed to represent learners' responses to feedback, none has considered the effect of different forms of elaborative feedback on learners' responses.

- ***Methodological***: The methodological approach of many feedback studies implied an association with a laboratory-based, experimental tradition of research. This tradition neglected the influence of context, as well as the interaction between task, instruction and feedback (Schimmel, 1983), and the subjective experience of the learner.

This thesis argues that more research is needed which takes forward previous research on programmed feedback and business problem-solving. To contribute to this need, the current research aimed to investigate business learners' expectations of, and responses to programmed feedback in e-learning applications, and to explore the implications for the design of e-learning feedback. The methodology developed to fulfil this aim is discussed in Part 3 of this thesis.

PART THREE

DESIGNING AND CONDUCTING THE RESEARCH

CHAPTER THREE
METHODOLOGY

3.1 INTRODUCTION

The idea for this research developed whilst I worked in a professional services organisation, designing and developing e-learning applications for the management consultancy practice. As I began to learn about previous research conducted in my field of interest, I based my proposed research design on the assumption that my research would and should adopt the same methodological approaches as those used in prior studies. This lead to assumptions that the research would be experimental or survey-based. As my understanding of the philosophical and operational issues surrounding research developed, and in response to a pilot study, the deficiencies in my initial assumptions became clear. By reflecting on these deficiencies and by considering alternative ways of addressing the research questions, I decided to begin with an exploratory research design. The evolution of this design is represented in the schematic below, and shows its culmination in the testing of several hypotheses developed from earlier findings.

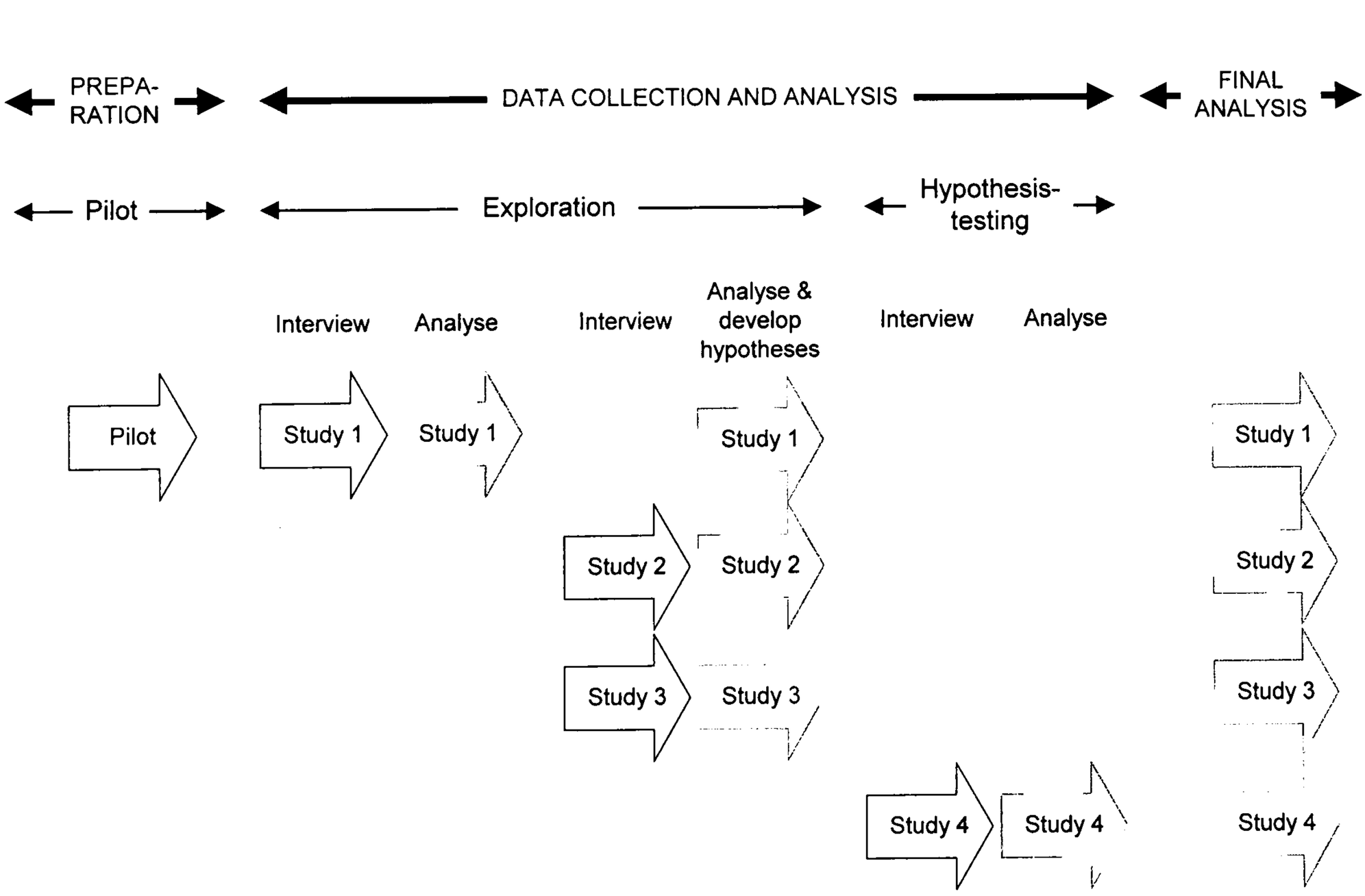


Figure 6: Evolution of research design

A graphical summary such as the one above provides a snapshot taken with the benefit of hindsight, but represents only the tip of a much larger iceberg. What is hidden are the ontological and epistemological assumptions which guided methodological decision-making,

and the events which influenced those decisions. Therefore, the remainder of this chapter presents three perspectives: a discussion of my interpretation of the philosophical debates pertaining to the nature of research; a narrative account of the evolution of the research design; and a summary of the final design. To provide a context for these three perspectives, the following section introduces the questions which framed this research.

3.2 RESEARCH QUESTIONS

Research questions may be framed in relation to the theoretical debates, empirical findings or methodological traditions which constitute the field of interest (e.g. Brown & Dowling, 1998). In particular, when defining a space in which to make a contribution, many researchers position their research questions against a context in which they have identified 'gaps' in the existing literature.

For this research, the gaps which influenced the development of research questions were summarised at the end of the previous chapter. The purpose of this research was to investigate those gaps. To do so, the research aimed to explore the function of feedback from the perspective of business learners using e-learning applications to develop their problem-solving skills. The process of translating this general aim into research questions required careful consideration not only of the appropriateness of different methodological approaches, but also of what was practically feasible. The research questions which were selected emphasised an exploration of learners' expectations of feedback, and their responses (i.e. 'outcomes') to e-learning feedback.

- What do learners expect from e-learning feedback?
- What influences learners' expectations of e-learning feedback?
- What are learners' outcomes on receiving e-learning feedback?
- What influences learners' outcomes on receiving e-learning feedback?
- What are the implications for a theoretical understanding of the function of e-learning feedback?
- What are the implications for the instructional design of e-learning feedback?

To guide development of a research design to answer these questions, it was necessary to understand the ontological and epistemological differences between the principal research traditions. The elements considered are discussed in the following section.

3.3 EXPLORATION OF THE PRINCIPAL RESEARCH TRADITIONS

This section discusses three of the main ontological and epistemological assumptions of the two principal research paradigms. Each of these discussions begins by presenting the main arguments of the debate, and then draws out the main implications for this research. For clarity, the terms 'quantitative' and 'qualitative' as they are used in this thesis are first defined.

3.3.1 DEFINITIONS OF 'QUANTITATIVE' AND 'QUALITATIVE'

A number of terms have been used in recent years to distinguish between the two main research paradigms. The 'quantitative' label is widely used as an umbrella term for research described as positivistic, scientific and post-positivistic, whilst the 'qualitative' label embraces approaches described as interpretive, naturalistic, critical and constructivist (Lincoln & Guba, 1985; Bryman, 1988; Guba & Lincoln, 1994; Oakley, 2000).

The labels 'quantitative' / 'qualitative' imply that the key differentiator between the two paradigms is one of degree of *quantification*. This implication has been described as "highly unfortunate" (Bryman, 1988: 3), since the differences are not only concerned with the use of numbers.

At a fundamental level, the differences between the two paradigms are philosophical as well as operational. Philosophical differences exist in relation to questions about the nature of reality, how that reality can be 'accessed', and the relevance of temporal and contextual influences. Operational differences exist in relation to the methods and techniques preferred by each tradition, although at the technical level, methods such as interviews have been applied to each tradition in different ways.

In spite of the somewhat misleading implications of the quantitative/qualitative terminology, alternative terms have not achieved such pervasive use in the academic literature (Bryman, 1988: 3). Therefore, during the following discussions on assumptions and limitations of the paradigms, the terms used are:

- ***Quantitative*** to refer to approaches associated with the positivist paradigm or which aim to apply the natural science model to the social sciences;
- ***Qualitative*** to refer to approaches associated with the interpretive paradigm.

3.3.2 ONTOLOGICAL AND EPISTEMOLOGICAL ASSUMPTIONS OF THE RESEARCH PARADIGMS

When beginning my doctoral studies, I was influenced by the predominantly quantitative traditions of prior feedback research, and began developing ideas of a research design which would be quasi-experimental and survey-based. On further reading it became apparent that within the research community there existed what has been described as "paradigm wars" (Gage, 1989; Oakley, 2000). Therefore, before committing to either paradigm, further exploration of the methodology literature was required.

My interpretation of this literature indicated three differentiating assumptions underlying the research paradigms, concerning: the nature of reality; the means by which researchers can 'come to know' that reality; and the importance of context. To a large extent, these assumptions refer to what Guba and Lincoln (1994: 108) call the "three fundamental questions" relating to ontology, epistemology and methodology.

The nature of reality: objective or constructed?

The debate

At the heart of the quantitative / qualitative divide is a debate about the nature of reality. The 'scientific realism' of the quantitative paradigm takes the view that the subject matter of scientific research and theories exists independently of our knowledge of it, and that the goal of science is the description and explanation of both observable and non-observable aspects of the world (Cambridge Dictionary of Philosophy, 2nd edition., 1999: 821). In this view, scientific inquiry represents a continual striving towards ever-closer approximations to what reality 'is', using inductive and deductive logic to continually improve upon: (a) the theoretical explanations of that reality; and (b) the instruments that measure it. An alternative position held by the logical positivists, whilst not denying the existence of a 'real' world, denied the epistemological utility of studying unobservable elements of it (Ibid., p514; Schwandt, 2001: 221). The latter position has few contemporary proponents, but the strict empiricist tradition with which it is associated still influences the conduct of quantitative research.

The ontological assumption of the qualitative paradigm offers a contrasting perspective. Reality is not 'out there' to be discovered, but is a construction of the human mind. This is not to say that tangible objects do not exist, but that each person's perceptions of them and the meanings he or she ascribe to them are individually constructed. Whilst individuals may *appear* to communicate about a single reality by using similar lexicons, the *meaning* of those words may differ without the communicators even realising it.

These conflicting assumptions imply fundamentally different possibilities for the foci of quantitative and qualitative research. For the former, the logical aim is to strive towards an ever more coherent representation of the theories and laws governing a single reality. Questions such as those of aesthetic or moral significance are deemed to fall outside the realm of legitimate scientific inquiry, and are therefore eschewed (Guba & Lincoln, 1994: 108). For qualitative research, an extreme view is that all one can aim for are descriptions of the idiosyncratic world-views of individuals and small groups, with no potential for generalisability outside the units of study.

Implications for this research

From the perspective of this research, each of these ontological positions posed different problems. The positivistic presumption of an objective reality, which is a strong influence in the quantitative tradition, was particularly problematic in the context of the primary aim of this research, which was to investigate the subjective experiences of learners. Moving away from this presumption lead to the adoption of a qualitative methodology to explore the *constructed* experiences of learners. However, the secondary aim of this research was to identify regularities across learners which could inform the development of an e-learning feedback pedagogy relevant to a wider group. This aim seemed inconsistent with the constructivist perspective that all meaning is personally-constructed and idiosyncratic, and that for each individual, 'reality' is different in all aspects of life. Resolution to this apparent contradiction of

ontological perspectives came from acceptance of a *social* constructionist notion of reality in relation to the focus of this research.

Social constructionism is a view within the qualitative paradigm which posits that knowledge in some areas is influenced by interactions and negotiations between relevant social groups. Knowledge is therefore *socially* as well as *personally*-constructed, allowing people within social groups to share similar interpretations and understandings of certain phenomena (Cambridge Dictionary of Philosophy, 2nd edition., 1999: 855; Schwandt, 2001: 31). Thus, although multiple constructions of reality do exist, in some areas these constructions converge to an important degree, producing a certain amount of systematic regularity in the interpretations and behaviours of individuals. Such regularities are particularly evident in areas of social life where long-term membership of various familial, social and cultural groups condition our ways of making sense of the world (Eysenck, 1953).

It is argued that for the purposes of this research, the workplace context of the participating organisation generated a homogenising influence on its employees. This was particularly strong given the organisation's modus operandi of creating cross-office project teams. Employees therefore spent long periods of time together on assignment away from home and sharing work and hotel accommodation. Furthermore, the organisation encouraged networking through seminars and training events, which meant that employees in this environment were accustomed to sharing similar learning experiences during class-based events. From a social constructionist perspective, it is reasonable to assume that by doing so they came to share similar lexicons and ways of interpreting those learning experiences, and that their interpretive schemes were inter-subjective because they had been developed through social processes of symbolic interaction. For example, it is likely that through discussing the merits and limitations of various training classes, employees developed shared criteria for evaluating the classes. Although it is acknowledged that employees' inter-subjective understanding of self-paced e-learning might be less developed, it is believed likely that some of the shared understandings about what constitutes 'good' training and 'good' feedback were likely to be transferred to the e-learning context.

Adopting a social constructionist perspective suggested that a qualitative approach would be required to address the questions which framed this research, and to investigate the meanings which individuals attach to their e-learning feedback experiences. The aim of identifying regularities across those experiences suggested that meaning-categorisation techniques were also needed.

'Coming to know': objective observation or subjective interpretation?

The debate

Implicit within the quantitative paradigm is an assumption that the process of research should be separate from the objects observed and measured. This implies a need to "purge the scientist of values which may impair his or her objectivity " (Bryman, 1988: 15), and a need to precisely define the means by which constructs are 'objectively' operationalised. It also assumes that the

'objects' of research (e.g. people) are not influenced by the process of being observed, a notion which has received strong opposition from the symbolic interactionists. A positivist influence has encouraged an orientation which values observed phenomena as well as constructs which can be fully operationalised and therefore 'measured' (e.g. see Oppenheim, 1992, on measurement theory).

By contrast, qualitative researchers place less credence on research findings which rely solely on observed and measured phenomena (such as overt behaviours), believing that such observations tell only half a story. Qualitative researchers emphasise the importance of understanding an individual's subjective perspective, but acknowledge the impossibility of 'proving' their interpretations of that perspective using the techniques of the quantitative tradition. Instead researchers seek to defend their interpretations of the experiences of others by reference to debates about how to select an appropriate "context for interpretation" (Kvale, 1996).

A standard objection to qualitative research is the impossibility of precisely reproducing the research process in order to uphold the 'reliability' of the findings; this is because qualitative findings are largely based upon a researcher's interpretations. Qualitative researchers have advocated other means to judge the credibility of findings, for example by assuring "transparency of process" (Rubin & Rubin, 1995: 85).

Qualitative researchers go on to raise their own criticisms of the quantitative tradition, claiming that in the pursuit of reliability and 'provable' measures, the validity of the findings is compromised.

Implications for this research

The methodological approach considered at the beginning of this research followed the quantitative tradition of much of the prior research on instructional feedback. The approach assumed that learners' experiences of feedback could be objectively measured using a structured survey and HCI (human computer interaction) measures. By reflecting on the methodological literature and early experience with pilots, the deficiencies of this approach became evident, and prompted a revised approach fitting more closely with the qualitative tradition. This evolution is discussed in section 3.4.

The relevance of context: a contaminating variable to be excluded or an intrinsic element to be studied?

The debate

The third dimension of difference concerns the importance attached to the context of the research, be it temporal, spacial, socio-cultural or environmental.

Quantitative researchers accord the influence of context less importance than is common with qualitative researchers because they believe that its influence can be 'factored out' - for example by transferring the object of research from its natural setting to the laboratory. This

assumption allows for large-scale methods such as surveys, which purport to offer statistical generalisability.

However, the excessive stripping out of context has been criticised for reducing the validity of research findings. In research on educational feedback, for example, there has been criticism of reliance of laboratory experiments using college students with no inherent interest in the learning material (Mory, 1996). To qualitative researchers, context is vital, because it is seen as part of the system within which individuals or groups construct meaning. Their argument is that context should therefore be part of the system studied when trying to interpret the individual's or group's perspective (e.g. Salomon, 1992). Therefore, a method recommended for qualitative research is observation of individuals and groups in a "naturalistic" setting (Lincoln & Guba, 1985).

A standard objection to this argument is that it produces descriptions and explanations of phenomena which have no generalisability beyond the immediate setting, leading to an accumulation of independent case studies and vignettes which cannot contribute to a deepening understanding of the phenomena in question. A common defence is that although qualitative research cannot make claims to statistical generalisability, the constructs, insights and implications inferred from one research setting may promote understanding of other settings through processes of theoretical generalisation (Firestone, 1993) or case-to-case generalisation (Kvale 1996; Firestone, 1993; Mason, 1996)

Implications for this research

In this research, context and naturalistic settings were recognised as important, but so too was the potential problem of 'changing' a person's experience of e-learning by observing him or her complete the full program (lasting between two and ten hours). Furthermore, the site where many learners completed their training was often inaccessible to a researcher: at home, in a hotel room, or whilst travelling by aeroplane. In the face of the limitations of a naturalistic approach, it was necessary to decide whether to abandon the research topic or whether to adopt alternative qualitative methods which would still allow access to this under-researched group of individuals. Believing that the topic could make an important contribution, the latter approach was selected. The workplace context was recognised as an influence on learners' experiences of feedback. Therefore, interviews were considered appropriate as they had the potential to accommodate the difficulties described above, without eliminating the importance of context.

3.3.3 DISCUSSION REGARDING THE PRINCIPAL RESEARCH TRADITIONS

This section has outlined important areas of contention between the quantitative and qualitative research paradigms, and considered the implications for this research. At the heart of the debate are important philosophical differences which belie the naïve assumption that a choice between quantitative or qualitative approaches is purely a technical one concerning the selection of a method to 'fit' the research question (Bryman, 1988: 1). Having compared the two philosophical traditions, I considered that a socio-constructionist approach was appropriate to

the research topic. Such an approach would involve the study of learners' subjective experiences of e-learning feedback and additionally a search for regularities between those experiences which might have implications for improved instructional design.

The philosophical debate was one of several influences on the evolution of the research methodology. Other influences and events are discussed below.

3.4 INFLUENCES ON EVOLUTION OF RESEARCH METHODOLOGY

The methodology for this research evolved not only from philosophical considerations, but also from personal influences. First among those were my experiences as a consultant and then an instructional designer at the participating organisation, developing an e-learning application on the organisation's new project management methodology. The application included tutorials and practice activities, with the latter structured around business scenarios, tasks requiring learner interactions, and feedback. During user-testing it became apparent that feedback - its quality and perceived credibility - was critical to the learner's overall evaluation of the e-learning. It was because of this insight that I decided to pursue doctoral research studying learners' experiences of e-learning feedback.

In addition to my own interest, the organisation, which had made substantial investments in e-learning, also believed it needed better insights into feedback, and offered me access to learners and e-learning applications for the purposes of my research. Discussions were in an advanced stage to include a second professional services firm in this research, but the firm withdrew to concentrate on a merger with another organisation, and no suitable replacement could be found.

During my negotiations with the organisation, it was tentatively proposed that I would provide instructional input into the development of a new e-learning application in order to evaluate learners' responses to the elaborative attributes of feedback. My intention was to study learners' subjective perceptions as well as their evaluations of the six alternative feedback designs using three data sources: a large-scale survey, measures of human-computer-interaction, and a small sample of structured interviews.

This approach reflected the quantitative research paradigm implicit in prior studies on programmed feedback, which I had begun to read as part of my review of the theoretical and empirical literature. These studies tended to adopt a hypothetico-deductive approach, using experiments in laboratory conditions aimed at isolating the impact of key variables. However, difficulties with this approach manifested themselves even before the research was started and prompted an important change in research design.

- The principal problem was theoretical. A methodology based primarily on a survey presumes that a well-established body of conceptual knowledge already exists on the research topic, and that the purpose of the survey is to test theoretical hypotheses. Yet as recently as 2002, a prominent academic-practitioner expressed concern that there is no formal theory of educational multimedia design of the type which includes instructional tasks

and feedback (Boyle, 2002). Given this lack of relevant theory, it was not surprising that only limited evidence was found to support an experimental investigation of the influence of *perceived challenge* and *complexity*, which I intuitively believed might be important attributes of feedback based on my prior experience as an instructional designer.

- Epistemological questions were also raised: for example, was a closed-question survey approach really suitable for a study of learners' subjective responses?
- Finally, due to adverse economic conditions, the organisation's training department was rationalised, resulting in the postponement of the development of new e-learning applications including the one I was to work on. The experimental research strategy was contingent on my being involved in the design of feedback in a new e-learning program, as well as on having access to users as they worked through the application. The postponement of e-learning development meant that I had to rethink my research design.

These difficulties prompted a shift away from an experimental hypothetico-deductive approach, towards an exploratory approach with an aim of discovering *what* learners' expectations and responses were, and *how* those responses could be explained as the interaction between different learners' expectations of feedback, the attributes of feedback and individual learner differences.

Exploratory approaches such as the one adopted for this research need to be carefully scoped, otherwise the researcher might be left to consider a vast array of interacting variables which would make analysis and interpretation very difficult. To reduce this risk, and following Eisenhardt's (1989) suggestion, an early decision was taken to identify one or more variables which might have an important influence on learners' experiences of feedback. By doing so, the identified variables could be investigated from the beginning of the research process.

After reviewing the theoretical and empirical literatures relating to the nature of feedback and problem-solving (presented in chapter 2), learners' *level-of-expertise* was selected as a potentially important variable. The literature suggested (e.g. Chi et al., 1988; Feltovich et al., 1997) that the level-of-expertise of problem-solvers has an important influence on the way they represent problems, and the strategies they use to solve them. If level-of-expertise influences the act of problem-solving, it is reasonable to propose that level-of-expertise might also influence learners' efforts to learn *about* problem-solving as well as learners' experiences of e-learning feedback.

3.5 OVERVIEW OF FINAL RESEARCH DESIGN

Previous sections discussed the philosophical questions which framed the design of this research, and presented a narrative account of the evolution of design. This section introduces the structure of the final design and presents a graphical summary in figure 7.

The research involved one pilot study and four main studies.

- The aim of the pilot study was to test the effectiveness of a draft interview schedule and a draft survey, and to compare differences between the conduct of telephone interviews and face-to-face interviews. The draft interview schedule related to interviewees' experiences of an e-learning application which was also used in study 1.

- Studies 1, 2 and 3 explored learners' subjective experiences of e-learning feedback, using materials drawn from e-learning applications which learners had recently completed. These applications were designed specifically for the participating organisation, and each aimed to develop different aspects of learners' business problem-solving skills. During the three studies, employees from the organisation were interviewed about their responses to e-learning feedback.

- As the research progressed, inductive analysis suggested the presence of consistent patterns in the way learners of different levels-of-expertise responded to e-learning feedback. To investigate these apparent regularities, study 4 adopted a deductive approach, and tested five hypotheses relating to learners' responses to variations in the attributes of e-learning feedback. The purpose of hypothesis-testing was to investigate propositions, the results of which would feed back into a process of "theorising" (Weick, 1995) about the phenomena studied. In other words, the aim was to contribute to a theorising about learners' experience of e-learning feedback, recognising that further studies would be required before a robust theory could be presented.

Research process	← Pilot →	← Exploration →	← Hypothesis testing →
Study	**Pilot** 8 employees; 4 interviewed (2 by phone, 2 F2F) 4 surveyed	**Study 1** 29 employees; 3 activities from *Zentoria* **Study 2** 18 employees; 3 activities from *Coaching Advantage* **Study 3** 13 employees; 3 activities from *Navigating the Grey*	**Study 4** 12 employees; 4 activities from *Zentoria, Coaching Advantage* *Navigating the Grey*, plus 1 new activity
Data collection	Employees were interviewed or surveyed to test the effectiveness of draft questions. Data was not included in analysis	Employees were interviewed about their recollection of three activities from e-learning applications recently completed	Employees were observed and interviewed while completing five storyboard activities developed from e-learning applications

Figure 7: Summary of research process and data collection methods in the pilot and main studies

3.5.1 CONCLUDING REMARKS

This chapter argued that the evolution of the research methodology was influenced by an exploration of the philosophical issues surrounding the conduct of social science research, and by other influences such as the traditions of prior feedback research. In exploring the merits and limitations of the quantitative and qualitative paradigms, I also sought to situate my own perspective within these two traditions.

In the context of these overall aims and methodological orientations, the next chapter discusses the design considerations relating to the selection of sampling strategies, and methods of data collection and analysis. Detailed procedures are then discussed in chapter 5.

Chapter 10 includes a discussion which acknowledges the influence of 'self' on the research process, and describes my own background and experiences including those at the organisation from which interviewees were drawn.

CHAPTER FOUR
METHODS

4.1 INTRODUCTION

The previous chapter described the evolution in methodology for this research. Whilst the methodology provided a framework, decisions remained about the selection of methods and strategies which could translate the methodology into a concrete design. This chapter presents the considerations which influenced the selection of data collection methods (including lessons learned from the pilot study), sampling strategies, and data analysis methods.

4.2 DATA COLLECTION

4.2.1 METHODS CONSIDERED

Having selected an exploratory approach for the reasons outlined in the previous chapter, it was necessary to select one or more appropriate data collection methods which could provide insights into the research questions. Selection was influenced by: logistical and resource constraints; the need to negotiate access to interviewees; and consideration of the methods traditionally used to study the research topic. The latter task was not as straightforward as might be expected because of the cross-disciplinary nature of the research topic, which spanned educational and cognitive psychology as well as, to a limited extent, management learning.

Much of the prior research on programmed feedback from the 1960s to the 1980s was influenced by the traditions of cognitive psychology, which typically used experimental and non-naturalistic approaches. However, for reasons outlined in the previous chapter, those approaches were eschewed in favour of qualitative approaches.

A tradition of qualitative approaches is found in the fields of education and management learning research. Data collection methods include interviews, observations, verbal protocol analysis (e.g. see Ericsson & Simon, 1984, regarding problem-solving research), research diaries, and documentary evidence, sometimes combined using a case study approach (e.g. Gomm, Hammersley & Foster, 2000; Stake, 1995; Yin, 1994). Case studies are particularly suitable when investigating complex systems involving many people, multiple roles, several contexts and numerous social interactions, such as the study of IT systems implementations (e.g. Walsham, 1995). However, for the study of individuals and their internal experiences, case studies are less common unless framed as "life histories" or "biographies" (Cresswell, 1998).

In order to identify the method appropriate to this research, five qualitative methods were identified: interviews, observation, verbal protocol analysis, diary journals and documentary

evidence. In addition, surveys - which are commonly associated with quantitative approaches - were considered in the early stages of the research process. Before selecting an appropriate method, the benefits and constraints of the available methods were considered.

Surveys

Surveys, particularly self-administered postal surveys, are commonly used in distance-learning research. An obvious advantage is that the sample can include users who are geographically distant, thereby increasing the potential to access a large sample which is likely to be representative of the target population. Advocates of the survey method argue that it provides a large quantity of hard numerical data which can be easily manipulated using statistical software (e.g. see Sapsford, 1999). However, a common criticism of survey-based research is that statistical correlations may be based upon variables which are arbitrarily defined, and which may therefore lack validity (Silverman, 2000).

As part of the preliminary investigation, a review was conducted of the existing surveys completed by users of the e-learning application used in study 1. Most of the questions were specifically aimed at *summative* evaluation; for example, many questions focused on the user's overall evaluation of the training, without inviting comments to explain those evaluations. This meant that the survey results were not useful in explaining users' evaluations. Nevertheless, for this research, surveys were considered to be potentially useful if the questions were directed at users' *formative* evaluations of the training; therefore, the decision was made to conduct a small pilot survey. Findings from the pilot survey, and an assessment of the usefulness of the data, are reported in section 4.2.2.

Interviews

Interviews potentially provide a rich source of data from interviewees describing their subjective perceptions of their experiences. According to what Silverman (2001) calls the "emotionalist perspective", interviews offer researchers a unique opportunity to “gaze into the soul of another”. An advantage of the interview method is that interviewees can reflect back on prior experiences and take a more analytic perspective as they consider and interpret those experiences in hindsight. In this research, for example, interviewees could be asked to reflect on their responses to e-learning feedback and to consider feedback's role in their process of learning.

The disadvantages of using interviews for this research revolved mainly around the logistical and financial constraints implicated in face-to-face interviewing. Most of the potential interviewees were full-time, fee-earning consultants or audit staff who travelled extensively. The conduct of face-to-face interviews would have required travel to the employees at a location of their choice, and at a time which did not conflict with their client requirements. The potential impact would have been to slow the research, and might have been perceived as undue interference in employees' work commitments, thereby reducing the number of willing participants. It would also have been prohibitively expensive.

An alternative would have been to restrict interviewees to a small number of consultants who were working in the London area. This has been the approach adopted in other user studies. For example, in Roberts' (1996) comparative study of Open University students' perceptions of tutor feedback and computer-generated feedback, he used a sampling frame limited to "within a reasonable driving distance of Milton Keynes where the researcher was based". However, at this exploratory stage of the research, the aim was to gain access to employees from a range of offices in the UK and North American offices of the organisation. The inclusion of the North American employees was important because at the beginning of this research (1999) e-learning was less of a novelty for them, and might therefore evoke different experiences from those of British employees.

A design option which could overcome these disadvantages was to use the telephone as a mediator for the interviews. By using the telephone, a wider range of employees could be accessed than would have been feasible using traditional face-to-face interview methods.

One disadvantage of using the telephone was the inability to present visual prompts at the appropriate time during the interview. Visual prompts such as screenprint images of tasks and feedback captured from the e-learning application were important so that interviewees had a common reference point for discussion. However, this disadvantage was overcome by sending visual prompts to interviewees by email, in advance of the interview date for reference during the interview.

Another concern was that use of the telephone might hinder the creation of a supportive environment for the interviews. However, the subject matter for this research was not considered to be especially politically or emotionally sensitive, and so the creation of a supportive environment was not considered to be a vital pre-requisite for discussion.

Telephone interviews were therefore selected as a method for this research, with the option to use face-to-face interviews at a later stage if appropriate (as was done in study 4). The pilot study compared the effectiveness of telephone and face-to-face interviews, and the findings are discussed in section 4.2.2.

Observation and verbal protocol analysis

Observational methods have a long tradition in ethnographic research, where the aim is to observe social interactions and behavioural practices. Observation is also used in educational research, where aims include the study of classroom interactions and behaviours for class-management research, and the study of social interactions to illuminate the socio-constructivist processes of learning. However, as a method of studying the cognitive and affective processes involved in solitary e-learning, it has limited application unless combined with a self-disclosure research method. Researchers from the domain of cognitive psychology responded to this deficiency by adopting the method of concurrent verbal protocol analysis ('VPA'), which required individuals to verbalise their thinking processes whilst engaged with a task. An advantage of VPA is that it is synchronous with individuals' real-time experience of interacting with training materials. Advocates of these methods argue that individuals' observed responses and

comments are a fairly accurate representation of what is going on inside their heads (Ericsson & Simon, 1984; Chi, 1997). However, the cognitive overload which burdens individuals is significant because whilst engaged with materials, they are having to articulate their perceptions and meta-cognitions to explain how they are processing that material.

VPA was considered for this research because it had the potential to shed light on how individuals learn from e-learning feedback. In my deliberations, I was aware that my presence as an observer recording the verbal protocols might distort the learner's experience of the e-learning application. Such applications typically take two hours or more to complete, and the thought of being watched for that period of time might have persuaded the learner to rush the training to 'get rid' of the observer. In addition, VPA would not be feasible for learners (and there were several) who allocated time for e-learning completion to their 'spare' time when travelling by plane to and from clients.

Less intrusive alternatives are available such as observation using the Open University's Data Capture Suite ('DCS'), where the learner is visually isolated from the presence of the observer. The DCS uses video to record the learner as they interact with the training application. Video is then synchronised with a record of their computer screen, human-computer interactions, and any verbal communication between the learner and observer which occurred during the training, before being analysed. In spite of the potential benefits of using the DCS, this option came with too many constraints to allow further consideration, especially as it was highly unlikely that the target group of informants would be willing to travel to Milton Keynes or to an equivalent nearby Data Capture Suite.

Although VPA and observation using the Data Capture Suite were not selected as the primary research method, I was able to observe interviewees during study 4, as they engaged with storyboarded sequences of tasks followed by feedback. To avoid the cognitive overload associated with VPA, I did not ask interviewees to verbalise their real-time thinking process, but waited until they had completed each storyboard sequence before asking questions. My presence was therefore more as an interested and patient interviewer, rather than a formal observer recording each body movement. However, it did mean that when I observed a strong facial or behavioural reaction to one of the storyboard sequences, I could ask a clarifying question.

Research diaries

The keeping of research diaries by informants is an under-utilised method in the field of educational research yet has potential benefits, particularly given the limitations of observational studies. Learners can immediately capture their experiences of e-learning feedback in written form (Symon, 1998), or use a pocket tape-recorder to record an audio diary. Diaries are most usefully used in conjunction with follow-up interviews, so that the meaning of diary comments can be discussed.

However, one major disadvantage, which was particularly pertinent to the target group of informants, is that the keeping of diaries would have extended the time taken to complete each

e-learning application. This would have made participation in this research more intrusive, which might have had an implied cost in terms of lost fee income or scarce family or leisure time. Therefore, in spite of the possible advantages, this method was considered unsuitable for the purposes of this research.

Documentary evidence

Some documentary evidence did exist prior to the commencement of this study, in the form of surveys completed by learners who had evaluated the e-learning application to be used for study 1. However, on examining the documents it was found that neither the survey questions nor the responses were relevant to the research questions.

4.2.2 INFLUENCE OF EXPERIENCES OF PILOT STUDIES

After considering the options above, the choice was narrowed to either interviews or surveys as the most appropriate method for this research, with the option of using observation in later studies as a secondary support for interviews. In order to progress, both methods were tested in a pilot study.

Pilot interview and survey schedules were designed and then tested on a small sample of individuals from the UK and North American offices who had recently completed the e-learning application to be used in study 1. The pilot involved four interviews (two by telephone; two face-to-face), and four email surveys, and the aim was to test the comparative effectiveness of the interview and survey questions, and to compare telephone and face-to-face interviews. The data collected was used to refine the interview process and was not used during analysis. The remainder of this section compares the effectiveness of the data collection methods in three areas: interviews vs. surveys; closed vs open questions; and telephone vs. face-to-face interviews.

Interviews vs. surveys

The pilot study revealed that interviewees and survey respondents rarely had a ready-made and easily-articulated set of comments, explanations and recommendations on the subject of e-learning feedback which could be 'mined' and extracted like nuggets of information (Kvale, 1996: 3) using a standardised survey or a structured interview. For example, when interviewees were asked for their comments on specific examples of feedback, they rarely gave succinct responses of the form "I perceived Example 1 as X, because Y, and it would have been improved by Z". Instead their responses were more tentative and indirectly revealing, and needed to be elaborated in the course of follow-on discussions. This suggested that a flexible semi-structured style of interviewing, which could accommodate the probing of interviewees' comments, would be more effective than a structured survey or interview.

Closed vs open questions

In the email surveys, responses to the open-questions were far more informative and revealing from a research perspective than responses to the closed, 'checkbox' questions. Furthermore, responses to closed questions often did not correlate with responses to similar open questions (designed to cross-check answers) which made interpretation of the interview data difficult.

Similarly, during interviews, use of open questions allowed interviewees to express their responses to feedback in their own words. The words chosen, and the emphasis and sequencing given to different words and expressions enabled me to interpret the meaning of interviewees' responses based partly on my own experience of working in the same organisation for almost five years. However, I was also aware that interviewees' words might be influenced by the interaction between interviewee and interviewer. For example, words might be performative, and the interviewee might try to present a 'front' and use impression-management strategies (Goffman, 1959), particularly if the research topic had a strong personal relevance.

The pilot studies suggested that impression-management strategies would not be of material concern in the current research, except perhaps when interviewees discussed in general terms their comparative views on e-learning and class-based training. For example, I became aware that UK interviewees were keen to promote the benefits of class-based training. Their apparent intention was to communicate (via me, to the organisation) their concern that e-learning would replace all class training as part of a cost-cutting exercise. North American interviewees seemed less likely to use such performative strategies, perhaps because they were more advanced in terms of e-learning, and were accustomed to, and accepted, the balance between e-learning and class-based training.

Open questions - or rather, interviewees' interpretations of and responses to them - were not without their own difficulties. Although they gave choice and responsibility to the interviewee, the richly-elaborated responses they elicited were not necessarily always *directly* comparable to the words chosen by other interviewees.

On the basis of the pilot interviews, the decision was made to supplement open questions with some closed questions. In order to benchmark some responses against one another, studies 1 and 4 included a closed question using a Likert scale, asking interviewees to rate the perceived usefulness of each feedback example. Supplementary open questions were asked to identify the reasons behind the ratings. Development of these questions is discussed in the next chapter.

Telephone vs. face-to-face interviews

Interviews conducted by telephone were found to be as effective as face-to-face interviews in creating a sense of rapport which facilitated discussion. Telephone interviewees were asked at the end of the interviews about their experience, and about whether they would have preferred a face-to-face discussion. The telephone interviewees felt that a face-to-face meeting would have been unnecessary and time-consuming.

4.2.3 METHODS SELECTED IN FINAL DESIGN

On the basis of findings from the pilot study, semi-structured interviews were selected as the primary data collection method.

During the exploratory work, three studies (study 1, study 2, and study 3) were conducted using different samples of interviewees and different forms of feedback to identify variations in interviewees' responses on receiving feedback. Each study was based on a specific e-learning application used in the organisation and which interviewees had recently completed, and used a different set of materials - screenprints representing three activities (task + feedback) - taken from the e-learning application. The three studies were conducted by telephone. The interview 'type' resembled Patton's (1982) interview-guide approach since although interviews were exploratory, they needed an informal structure and focus.

Because interviews in sections 1, 2 and 3 were conducted *after* the interviewees had completed their e-learning application, it was important to ensure that they recollected the three activities as fully as possible. To do this, interviewees were given screenprint images of the specific e-learning activities, (see Appendices E, F and G). Each screenprint was identifiable by description and page number, which was referred to at the appropriate point during the interview. These were e-mailed to the respondents prior to the interviews. This strategy has parallels with the technique of retrospective verbal protocol analysis developed by Ericsson and Simon (1984: 16).

On the basis of analysis of studies 1, 2 and 3, five hypotheses were developed to test the major themes, particularly with regard to differences in the way interviewees of varying levels-of-expertise responded to variations in the attributes of feedback. Study 4 was designed to test these hypotheses, and used storyboarded activities taken from the three e-learning applications in order to do so. Screenprints of these activities are presented in Appendix H. Study 4 depended upon interviewees physically interacting with the storyboard e-learning activities embedded in a PowerPoint presentation during the interview. Telephone interviewing would not have been suitable for this purpose; therefore, study 4 used face-to-face interviews, and the sampling frame was limited to employees working for the London office.

A full account of the four studies and the materials used to support them is given in the next chapter on detailed design and procedures. Also included are procedures for interviewee contact and post-interview follow-up, and interview question design.

Before progressing with the interviews, it was important to determine sampling strategies for this research. These are discussed in the next section.

4.3 SAMPLING STRATEGIES

Sampling strategies were required at three levels: (1) selecting interviewee candidates; (2) selecting e-learning applications; and (3) selecting example activities within those applications.

4.3.1 SELECTION OF INTERVIEWEE CANDIDATES

Sampling frame

The empirical setting for this research was a professional services organisation which was one of the "Big 5" accountancy and advisory services organisations, operating in the UK and globally. The reasons for selecting this organisation were discussed in chapter 1. The original intention was for the research to include two professional services organisations, enabling a comparative analysis to be conducted. However, it was not possible to negotiate access to the second organisation once it became engrossed in merger talks.

With the sampling frame re-orientated towards a single organisation, the research was in a position to explore the influence of *within* organisational differences such as employees' level-of-expertise. This was because the workplace culture of the organisation was relatively homogenous. Employees, because of standardised recruitment procedures and training processes as well as an emphasis on cross-office team work, tended to share common organisational values. These values included the importance of teamwork, of meeting commitments to the client, and of presenting a professional approach and attitude.

In the management consultancy practice, from which all but nine interviewees originated, employees from the UK and North American offices were accustomed to working with each other in cross-office project teams and often spent long periods together, away from home. Therefore, the sampling frame was limited to employees from these offices. Studies 1, 2 and 4 were limited to the management consultancy practice. The application in study 3 was targetted to a wider audience within the organisation, and therefore that study included employees from the consultancy practice as well as from the audit and operational research & support units. Study 4 was limited to employees who were working locally to the London office and therefore available for face-to-face interview, because that study required interviewee interaction with storyboard activities.

Sampling strategy

It was not feasible (nor an intention) to make statistical generalisations covering the whole population in the organisation, because of the relatively small number of people to be interviewed. Nevertheless, attempts were made to reduce the effect of systematic bias whilst at the same time ensuring a good spread of level-of-expertise among interviewees. The sampling strategy chosen to fulfil these needs had two components: the first was time-based; the second was theoretical.

The first requirement for studies 1, 2 and 3 was to select only those learners in the organisation who had completed one of the three target e-learning applications within three weeks prior to requesting an interview. Study 4 used materials from a composite of more than one e-learning application. Therefore a strategy was adopted to select interview candidates who had not yet completed any of the three e-learning applications. Following Sapsford's (1999) recommendation, an effort was made to check for any kind of systematic bias in studies 1, 2 and 3 caused by the decision to sample only from those people who had recently completed the e-learning training, or (in study 4) to sample only from those who had not completed the applications. This was done by discussion with the training administrators and resource managers who were responsible for selecting interview candidates. No bias was suspected.

The second requirement was to ensure that the sample contained employees with differing levels-of-expertise, as defined by the organisation. In study 4, which tested hypotheses relating to differences in novices' and experts' responses to feedback, the organisation was specifically requested to nominate equal numbers of novice and expert candidates for interview. In practice, the sample was more evenly spread in terms of levels-of-expertise, and contained roughly equal numbers of novices, intermediates and experts.

The samples obtained on the basis of this strategy are described in the next chapter.

4.3.2 SELECTION OF E-LEARNING APPLICATIONS

The three e-learning applications used – *Zentoria*, *Coaching Advantage* and *Navigating the Grey* – were selected from the organisation's portfolio of bespoke applications used to develop employees' problem-solving skills. Within the organisation, these were considered to be high quality, professionally-produced, well-designed and innovative examples of e-learning applications. *Zentoria* also received external recognition, winning an OMNI Intermedia award in 2000[2]

For study 1, *Zentoria* was selected because it represented an important training application whose evaluation was of keen interest to the organisation. For comparative purposes, applications for studies 2 and 3 needed to include different activity designs. From the pool of e-learning applications available, the two chosen (*Coaching Advantage* and *Navigating the Grey*) were selected based on recommendations from study 1 interviewees, and on request from the organisation for these programs to be considered. The latter applications had already been rolled out in the North American offices of the organisation, but had not yet been rolled out to the UK offices. Table 2 gives a summary of the e-learning applications used.

	E-learning applications	
Study #	**E-learning title and subject matter**	**Delivery method, and type of activities selected for study**
1	*Zentoria* Introductory level e-learning introducing the organisation's project management methodology	CD-ROM Open-question tasks and non-verificational, model-answer feedback
2	*Coaching Advantage* Introductory level e-learning introducing the organisation's approach to coaching and mentoring	Web Closed-question tasks and verificational feedback
3	*Navigating the Grey* Awareness training, to introduce employees to the ethical dilemmas they face in the workplace, and to introduce a process for dealing with those issues	CD-ROM Closed-question tasks and verificational feedback
4	N/A The 5 instructional activities included in the program were built using activities from the 3 e-learning applications listed above, plus one new activity	Storyboard, using Powerpoint hypermedia program Open-question and closed-question tasks, followed by model-answer or verificational feedback

Table 2: E-learning applications used in each study

[2] http://www.omniawards.com

4.3.3 SELECTION OF ACTIVITIES FROM THE E-LEARNING APPLICATIONS

For studies 1, 2 and 3, the three activities selected for discussion were chosen because they differed in design format – therefore enabling comparative analysis – whilst still being representative of the overall style of the application. Study 1 used three open-questions followed by non-verificational feedback. Studies 2 and 3 used three multiple-choice questions followed by verificational feedback of various styles.

In study 4, five activities were constructed, mainly using examples from the e-learning applications used in studies 1, 2 and 3. One activity was constructed to test each hypothesis developed from findings from the previous studies.

The materials used to present these activities are described in chapter 5.

4.4 DATA ANALYSIS

The selection of approaches and methods required strategic decisions about how to address the research aims as well as how to demonstrate the credibility of the analytic approach. This section begins by discussing the influence of the research questions, and section 4.4.2 introduces the general approaches which were selected: "meaning categorisation", and to a less extent "meaning interpretation" (Kvale, 1996). These approaches required a degree of judgement and interpretation; therefore, following Kvale's (1995) recommendation, page 78 explicates the context for interpretation which related to this research.

The selection of specific methods and analytic tools used under the umbrella of these approaches is discussed in sections 4.4.3 and 4.4.4. Decisions about method selection required assumptions to be made about how those methods and tools would work in practice. With the benefit of hindsight, an account of the procedures used to combine and adapt these methods and tools is given in the next chapter.

4.4.1 INFLUENCE OF RESEARCH AIMS AND QUESTIONS

The research aims and supporting questions were exploratory, concerned with discovering the nature of interviewees' expectations of, and responses to e-learning feedback and in doing so to draw implications about the function of feedback. To support the analysis of data, approaches and methods were needed which could describe, conceptualise, explain and - where appropriate - categorise interviewees' expectations and responses to feedback.

The general approach and specific methods selected for this research are listed below, and are described in the remainder of this section.

General approach

* Meaning categorisation
* Meaning interpretation — *Used to a limited extent*

Specific methods

* Open-coding
* Constant comparative method
* Analytic induction
* Deviant case analysis
* Tabulations
* Inter-rater cross-checks
* Triangulation
* Member checking

Used to a limited extent

Figure 8: General approaches and specific methods used to analyse research data

4.4.2 GENERAL APPROACH

Determining a general approach

The analysis of qualitative data is not amenable to standardised procedures, but is instead a somewhat fluid process. For the purpose of this research, what was needed was a general, orientating approach which could guide the selection of specific techniques and methods. At this macro-level, the framework of Kvale (1996) was found to be particularly helpful, since it differentiates five general approaches to qualitative analysis: meaning categorisation; meaning condensation; meaning interpretation; narrative structuring; and generating meaning through ad hoc methods. In this research, *meaning categorisation* was identified as the most appropriate, although it was recognised that elements of *meaning interpretation* might also be relevant.

Meaning categorisation implies that the interview is coded into categories, thereby fragmenting and structuring a large text. This approach was considered suitable because although it became apparent that there were differences between learners' experiences of feedback, there were sufficient similarities to enable comparison and categorisation. Categorisation was particularly important for aspects of learners' experiences which could be described as "central" (Strauss & Corbin, 1998) to their experience, such as learners' sense of *closure* on receiving feedback.

The process of categorising qualitative data through coding requires a degree of interpretation on the part of the researcher. This presumes a backcloth of prior experiences and personally- and socially-constructed frameworks for interpreting the world, or allegiance to a specific interpretive framework such as that provided by the psychoanalytic theories of the individual. My own context for interpretation is discussed below.

Defining my context for interpretation

Qualitative data can be described, conceptualised and categorised using several perceptual lenses depending on the epistemological orientation of the researcher. Although qualitative data can be analysed *quantitatively*, for example using manifest content analysis, most analytic approaches require a degree of qualitative interpretation. There are many layers and contexts for interpretation, each of which places constraints on the researcher's choices about how to communicate and validate findings (Bryman, 1988: 80; Kvale, 1996: 213). Kvale has developed a useful model for representing this interpretive space, which is represented (and adapted) in table 3 in order to position this research.

Contexts for interpretation	Description	Communities of validation
Self-understanding	The interpreter attempts to formulate in a condensed form what the interviewees understand to be the meanings of their statements. Only the interviewees themselves can validate this interpretation.	The interviewed subject
Critical commonsense understanding	The interpreter goes beyond reformulating the interviewees' self-understandings, while remaining within the context of a commonsense understanding.	The general public
Theoretical understanding	The interpreter applies a theoretical frame for interpreting the meaning of the interviewees' statements, for example drawn from a psychoanalytic theory of the individual or a Marxist theory of society.	The research community

Table 3: Contexts for Interpretation and Communities of Validation, adapted from Kvale (1996: 214)

For research studies sitting inside a single theoretical framework, Kvale's model offers the label of *theoretical context of interpretation*. This label was not appropriate for this research, because the topic (business learners' experiences of e-learning feedback) spans several disciplines including educational psychology, management development and cognitive science, each with their own theoretical frameworks which inform research practice in their discipline.

Within educational research, there are no recognised 'grand' theories of learning which have the same status as other fully-elaborated theories, such as Marxist theories of society, or psychoanalytic theories of the individual. In educational research, the behaviourist and cognitivist theories of learning are no longer advocated to the extent they were twenty or more years ago, and the constructivist and socio-constructivist theories are more akin to umbrella perspectives which encompass many ideas, themes and substantive theories about how humans learn and develop. Therefore, the context of interpretation selected for this research was a "critical, commonsense understanding" (Kvale, 1996), where that commonsense was informed by constructivist and socio-constructivist perspectives on learning.

Reliance on a critical, commonsense understanding requires explication of two important influences on the process of interpretation: firstly, the researcher's background and experiences which influenced the research process; and secondly, the specific methods used to enhance the rigour and comprehensiveness of the analytic process. In the context of this research, my background and experiences are presented in chapter 10; the selection of specific methods is discussed in the next section.

4.4.3 SPECIFIC METHODS

The previous section identified the *general approach* for this research: meaning categorisation. Meaning categorisation involves pattern-recognition which is a skill developed through practice, reflection, and familiarity with data, but always with the danger that the outcome may be flawed by bias and "anecdotalism" (Silverman, 2001); for example, the comments of articulate interviewees may be given undue prominence compared with the words of a more tentative speaker.

To overcome the effect of these potential biases, it was important to select specific methods and tools which would enhance the rigour of the analysis. Qualitative researchers have suggested several such methods. Silverman (2001) recommends five: analytic induction, constant comparative method, deviant-case analysis, comprehensive data treatment, and use of appropriate tabulations. Miles and Huberman (1994) suggest process strategies which can be built into the research design, such as: triangulation; replication of findings; running if>then tests; as well as tactics to retrospectively test and confirm findings such as deviant-case analysis, member checking, and retrospective checks on evidence. These methods are usually applied continually throughout the cycles of data generation and analysis, and not solely during the final analysis.

Methods selection was also influenced by the original formulation and later development of a grounded theory methodology (Glaser & Strauss, 1967; Glaser, 1978, 1992; Strauss & Corbin, 1998). Particularly influential were methods which were developed to conceptualise raw data, such as open coding and constant comparative method. However, the full panoply of methods, techniques and procedures were not adopted for two reasons. The first was that whilst grounded theory seeks to develop substantive theory, guided by objectives such as "saturation" to ensure comprehensiveness of the resultant theory, the aim of this research was more modest: in this research, the aim was to explore, conceptualise and theorise, recognising that full theory-development would probably require further work. The second reason was a personal perception that strict adherence to the set of techniques and procedures advocated in the current form of grounded theory (Strauss & Corbin, 1998) would, as one author has put it, "get in the way" (Melia, 1997: 32) of interpreting the meaning behind the data.

Using Silverman (2001) as a guide and where appropriate augmented by Miles and Huberman (1994), as well as being influenced by a grounded theory approach, the methods adopted during analysis were open-coding, constant comparative method, analytic induction, deviant case analysis and tabulations, and to a limited extent inter-rate cross checking, triangulation and member checking.

Each of these methods, and the way they were applied in this research, is discussed in more detail in the remainder of this section.

Open-coding

Open-coding is associated with a grounded theory approach, and has been described as the process of conceptualising the raw data contained in transcripts and similar materials.

> "... to uncover, name, and develop concepts, we must open up the text and expose the thoughts, ideas and meanings contained therein. Without this first analytic step, the rest of the analysis and the communication that follows could not occur." (Strauss & Corbin, 1998: 102)

Open-coding is thus a *technique* in the sense that it involves fragmenting data and labelling the concepts which each fragment represents, for example using code-labels such as "what's missing?", "workload ", "CBT as theatre". However, it is also a *strategy* which facilitates a process of thinking about the data and the concepts suggested by it, and of "hearing the meaning" in the data (Rubin & Rubin, 1995: 240).

In this research, the output from open-coding was an indexation of codes of the type described by Miles and Huberman (1994) as "first-level coding". Such codes were later recombined and analysed using techniques such as constant comparative method.

Constant comparative method

Like open coding, constant comparative method is a technique of inquiry which achieved prominence in the formulation of a grounded theory approach to inductive analysis.

In this research, constant comparative method was used principally when analysing the main conceptual categories which comprised learners' experiences of e-learning feedback; i.e. *styles-of-engagement*, and *outcomes* on receiving feedback. By comparing and contrasting learners' experiences, underlying dimensions could be discerned which enabled the analysis to move from description to a more abstract level. The process of reading, conceptualising and comparing themes in the transcripts meant that there was a continuous cycle of comparing and refining the analysis, which ultimately enhanced the overall quality of the research.

Analytic induction

Analytic induction is a rigorous method built around regular iterations between case analysis (for example, taking each interview as a 'case'), hypothesis development, next-case analysis, hypothesis redevelopment, and so on. This research did not follow a strict process of analytic induction. However, it was inductive, in that studies 2 and 3 built on the findings from study 1 by adapting the interview schedule and choosing new materials. It was not until the interviews from study 3 were transcribed and analysed that the research hypotheses were finally developed. These hypotheses were then tested in the fourth study using a different interview sample. This process - interview, analysis and re-development of interview schedules and materials before progressing with the next study - meets much of the spirit of analytic induction.

Deviant-case analysis

This method of analysis involves actively seeking out interviews which contradict emergent categorisations and propositions. Deviant-case analysis was used in this research during the later iterations of analysis. In the exploratory analysis conducted for studies 1, 2 and 3, interviews which seemed to be contradictory to the main categorisations and themes were analysed to identify new categories which were previously missed. In study 4, which tested hypotheses, interviews which did not support the proposed hypotheses were investigated to identify alternative explanations for the unanticipated results.

Tabulation of results

Tabulation of results using simple counting techniques offers a way of summarising large bodies of data. Instead of "taking the researcher's word for it" (Silverman, 2001: 241), readers can gain a sense of the homogeneity or heterogeneity of data.

In this research, tabulations were particularly important when presenting the range of learners' categories of *styles-of-engagement* and *outcomes*, and to indicate the interaction between these categories and learners' level-of-expertise. Tabulation of results first required that the qualitative data be transformed into numerical equivalents, and this was achieved using procedures described in section 7.7.1. Such transformations and the interpretations made from them should be treated with caution because the quantification of qualitative data inevitably results in some loss of meaning, and relies on subjective interpretation. Therefore this research only used transformations and tabulations to a limited extent.

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The methods detailed above were used to varying degrees during analysis of the four studies. For example, constant comparative method was important during the exploratory studies, but less so during study 4 where the primary aim was to test hypotheses rather than differentiate categories. These do not represent an exhaustive list. Eminent researchers have proposed other methods which were considered but, because of limitations, used only to a limited extent. Most significant of these were inter-rater cross-checking, triangulation and member checking.

Inter-rater cross-checking

At one extreme, the idealised goal of inter-rater cross-checking is that independent raters, with the same coding guidelines, can make exactly the same interpretations of a piece of text. In practice, expectations are usually less positivistic. For example, from a hermeneutical perspective, inter-rater reliability would be limited to the extent that raters come from the same theoretical perspective and ask the same research questions.

At the opposite extreme, researchers influenced by postmodern perspectives might deny the possibility of two researchers ever having the same interpretations of a specific text, proclaiming than an attempt at strict convergence would lead to a "tyranny by the lowest common

denominator" – i.e. agreement at such a trivial, surface level of data that interpretations become facile (Kvale, 1996: 181).

Recognising the arguments of both perspectives, I considered it important to devise a strategy which achieved a balance between seeking full inter-rater reliability, or ignoring it to rely upon my own idiosyncratic interpretations. Since no other researchers were known to be engaged in precisely the same research topic, I approached researchers in related fields who were willing to compare and discuss my interpretations. Using this approach, I intended to calibrate my interpretations against theirs and use the process to evaluate my analytic strategy. The detailed procedures used to implement this strategy are described in the next chapter.

Data triangulation

Triangulation of data is useful as a reminder of the situatedness of people's conversations and actions. By generating data from several sources, researchers can see the richness and natural complexity of a phenomena, which helps them avoid simplistic interpretations which make sense only in a single context. However, additional claims for triangulation - both of methods and of data - have been questioned in recent years. One argument is that triangulation of *methods*, which may be drawn from different theoretical and epistemological perspectives, cannot produce an 'objective' truth.

> "The accuracy of a method comes from its systematic application, but rarely does the inaccuracy of one approach to the data complement the inaccuracies of another" (Fielding & Fielding, 1986: 35).

Even when using a single theoretical perspective, triangulation of *data* does not necessarily help the researcher to build a more 'complete' picture because contextual contradictions between those datasets cannot necessarily be reconciled (Hammersley & Atkinson, 1983, quoted in Silverman, 2001). In this argument, data triangulation should not be used to adjudicate between accounts, as though one set of accounts can be 'proven' to be more accurate that the other (Silverman, 2001: 235).

The methodology for this research did not allow for triangulation from multiple sources and methods, but did provide different perspectives on the research topic. For example, the research comprised four studies, each with different interviewees. The interview schedules were adapted for each study, but in essence each explored the same topic, namely interviewees' experiences of feedback in an e-learning application.

Member checking

The advantages of this strategy, where the interviewee checks the validity of the researchers' findings, have been challenged in recent years (e.g. Silverman, 2001; Mason, 1996). A major concern is that research findings are usually written for communication to a research audience, and that the second-order interpretations contained therein may have little or no meaning for the lay interviewee. The interviewee's 'approval' therefore confers limited legitimacy to the arguments of the researcher.

On the other hand, it is still seen as good ethical practice to offer interviewees a copy of their transcript and to be open to comments. Any comments and requested revisions do, however, need to be treated as new sources of data because apparently-innocent clarifications may represent strategies at impression management. In the current research, all interviewees were offered the full transcripts; three requested their transcript; no revision requests were received.

4.4.4 TOOLS SELECTED TO SUPPORT ANALYSIS

Consistent management and organisation of data is essential to enable researchers to be able to repeatedly review their data during analysis. Many sophisticated software tools can assist this process, replacing manual techniques which rely on scissors and cutting-and-pasting. With many structured software tools as well as manual techniques available, it was necessary to decide which tool to select for this research, and for which aspect of analysis.

Manual reading of hard-copy transcripts is seen as particularly useful during preliminary analysis, to get a sense of the range and variability of data (Rubin & Rubin, 1995; Dey, 1993). To scan the equivalent documents on-screen is usually more tiring on the eyes. However, manual analysis is limited in important respects. The principal limitation is that manual coding procedures for cross-referencing themes and annotations are time-consuming, cumbersome and relatively inflexible when compared with the procedures provided by code-and-retrieve software. Reliance solely on manual techniques might therefore encourage too linear an approach to the analysis, resulting in insufficient attention being given to the searching and cross-referencing of themes and concepts which cut across interviews.

Software tools, on the other hand, allow for a multidimensional perspective. However, the use of structured software tools is not entirely risk-free. It has been suggested that such tools can hinder the free associationist thinking which is an important element of creative insight. Code-&-retrieve software, for example, has been blamed for the prevalence of 'coding fetishism' (Delaney, 2000) which keeps the researcher stuck in the preliminary stages of analysis, blinding them from the bigger analytic picture (e.g. Coffey et al., 1996). Others, however, have countered that many researchers have demonstrated their capability of using code-&-retrieve software without restricting themselves to a first-order level of analysis (e.g. Marshall, 1999, 2000), particularly if care is taken to avoid "coding traps" caused for example by over-tiredness (Richards, 2000; Gilbert, 2000a, 2000b).

Taking account of these arguments, the strategy adopted in this research was to iterate between manual analysis, and computer-assisted analysis using a combination of tools such as code-and-retrieve software (NUD*IST NVivo[3]), concept mapping software (MindManager[4]), and computer spreadsheets (Microsoft Excel[5]). Selection of NVivo and MindManager is discussed next.

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[3] NUD*IST NVivo is a product of QSR International Pty Ltd, http://www.qsr.com.au/products/nvivo.html

[4] MindManager is a product of MindJET LLC, http://www.mindjet.com

[5] Microsoft Excel is a product of Microsoft Corporation, http://www.microsoft.com

Selection of NUD.IST NVivo

NVivo was selected as the code-and-retrieve software because it had better search functionality than other similar packages, and a good user-friendly interface. Additionally, NVivo has the functionality to run matrix searches which cross-check each coded transcript against codes or interviewee attributes, revealing densities which can then be analysed qualitatively or quantitatively. AtlasTi[6], NVivo's main competitor, did not appear to provide such comprehensive search functionality at the time of this data analysis. Another key factor in selecting NVivo was that it is well supported technically and methodologically, particularly by the CAQDAS project at Sussex University, and by the regular QSR-NUD*IST conferences in London's Institute of Education. An example screenprint from NVivo is presented in Appendix K.

Selection of MindManager

NVivo presents coded data in the form of lists. A potential danger was foreseen in that list functionality affords a 'shopping list' mentality when analysing data. To counter this, the use of NVivo was complemented with a concept mapping application - *MindManager* - to visually represent relationships between codes. *MindManager* was already known to me as a concept-mapping tool, and was favoured because it is more user-friendly than *VisiMap*[7] or *Decision Explorer*[8]. An example screenprint from NVivo is presented in Appendix L.

The procedural steps taken to analyse data, involving the use of NVivo, MindManager and other tools, are described in section 5.6 in the next chapter.

4.4.5 DISCUSSION REGARDING DATA ANALYSIS METHODS

Use of the methods and tools discussed above offered a systematic and comprehensive approach to the analysis of data.

The approach involved a careful, systematic effort and an attention to detail, whilst remaining open and responsive to surprises and new insights. There was a danger of being overwhelmed by the sheer number of interviews or transfixed by the narrative on each page, and this might have resulted in an oversight of important patterns within and across interviewees. Efforts to overcome these pitfalls involved the continual interplay between manual and software-assisted methods of analysis. Furthermore, data was analysed and re-analysed several times during the period of research: during preliminary analysis, before writing reports to the participating organisation, when preparing conference papers, and when writing up this thesis. On each occasion, analysis was systematic, and was conducted over several weeks or months. Although systematic analysis does not guarantee credibility of analysis, the quality of analysis improved with each reading which facilitated a more rounded, perceptive interpretation of the data.

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[6] AtlasTi is a product of Scientific Software Development, http://www.atlasti.de

[7] VisiMap is a product of Coco Systems Ltd, http://www.coco.co.uk

[8] Decision Explorer is a product of Banxia Software, http://www.banxia.com

4.5 CONCLUDING REMARKS

This chapter presented the considerations leading to the selection of methods, strategies and tools for the key research processes: sampling, data collection, and data analysis. Having implemented these decisions, and with the benefit of hindsight, the next chapter describes the samples obtained and the procedures and materials used.

CHAPTER FIVE
DETAILED DESIGN AND PROCEDURES

5.1 INTRODUCTION

The previous chapters discussed ontological and epistemological influences as well as methodological decisions which guided the research design. This chapter follows on by describing detailed aspects of the procedures.

Procedural decisions are those which make the methodological framework more concrete and more real. They show how methods are applied to a specific research situation, and in some cases, how methods are adapted to address the day-to-day contingencies which are a natural consequence of "doing qualitative research" (Silverman, 2000).

This chapter gives an account of the main procedures and detailed design issues involved in implementing the research design. Six areas are discussed:

- sampling frame and resultant sample for each of the four studies
- e-learning materials and procedures used in the four studies
- contact and follow-up procedures for interviewees
- development of the interview structure and questions
- analytic procedures
- ethical considerations relating to the conduct of this research

5.2 SAMPLING FRAME AND RESULTANT SAMPLE FOR EACH STUDY

The sampling strategy was presented in the previous chapter, and included a discussion of decisions relating to the selection of the participating organisation, and general principles relating to definition of the sampling frame. This section describes the sample generated for each study. Some features were common only to studies 1, 2 and 3, such as the use of a time-based sampling strategy, defined below for study 1. Other features were common to all studies, including the use of screenprints taken from e-learning applications for use as prompts during interviews.

5.2.1 STUDY 1: ZENTORIA

The sampling frame included all management consultants, from the UK and North American offices of a professional services organisation, who had completed *Zentoria* within three weeks prior to the request for interview. A time-based sampling strategy was chosen so that interviewees' recollections of the e-learning would be relatively fresh. It was also important to ensure that the sample contained employees of varying levels-of-expertise. This was because, as discussed in previous chapters, level-of-expertise was identified as a potentially important influence on learners' experiences of feedback. Section 5.5.2 explains the rationale for selecting interviewees' organisational grade as a proxy measure of their level-of-expertise. The organisational grade of interviewees in study 1 ranged from 1 (lowest grade) to 5 (senior manager).

To aid recall, screenprints of the three activities selected for discussion were emailed to candidates prior to interview. Twenty-nine candidates responded to the request for an interview giving a response rate of 85%. The number of interviewees from the UK and North American offices were 13 and 16 respectively. The influence of office location as an independent variable is discussed in chapter 6.

5.2.2 STUDY 2: COACHING ADVANTAGE

Study 2 used a sampling frame of all management consultants who had completed *Coaching Advantage* within three weeks prior to the request for an interview, and who were based at the North American offices of the organisation. The sampling frame was limited to North America because at the time of research, neither *Coaching Advantage* nor *Navigating the Grey* had yet been rolled out to the UK offices.

Eighteen candidates responded to the interview request giving a response rate of 90%. As with study 1, a sample was sought which contained employees of varying levels-of-expertise. The sample contained employees of grade 3 to 7. No employees of grades 1 or 2 were available since only coaches (who had to be grade 3 or above) were eligible for *Coaching Advantage* training.

5.2.3 STUDY 3: NAVIGATING THE GREY

Study 3 used a sampling frame of all employees who had completed *Navigating the Grey* within three weeks prior to the request for an interview, and who were based at the North American offices of the organisation. Employees were drawn from three areas of the firm: management consultancy services ('MCS'), audit, and operational research & support ('OR&S'). Examples of OR&S activities are: administration of payroll services for clients; technology management; and human resource advice. Thirteen candidates responded to the interview request giving a response rate of 62% (MCS = 4; Audit = 5; OR&S = 4). The sample contained employees of grades 1 to 5.

Study 3 had a lower response rate compared with other studies, largely due to the lower response rates from the audit and OR&S staff[9]. The difference in response rates may be a reflection of differences in the cultural norms of the three groups. Audit and OR&S staff tend to rely on formal and hierarchical relationships, whereas management consultants are encouraged to work using mutually supportive networks of colleagues and non-colleagues[10]. The culture of the latter group may have translated into a greater willingness to assist the work of an external researcher.

5.2.4 STUDY 4

The sampling strategy used in study 4 differed from that of the previous studies in order to meet different research aims.

In studies 1, 2 and 3, the research aim was exploratory. A sampling strategy was selected which allowed access to a wide range of employees, irrespective of the geographic location of their office, who had recently completed a specific e-learning application. In these earlier studies, the sampling strategy was therefore driven by the criterion of recent e-learning experience rather than location, and interviews were conducted by telephone.

In study 4, the research aim was to test hypotheses developed from earlier studies. The required procedures were too complex to be carried out by telephone, and so a face-to-face interviewing method was selected. The sampling frame was restricted to consultants based in the London offices, who were identified by their resource managers as available for interview (i.e. not working off-site at the client's premises). The geographic nature of the sampling frame therefore contrasted with studies 2 and 3 which drew on a sampling frame of employees from the North American offices. Study 1, which drew on both UK and North American employees, had not revealed significant differences in the feedback comments of these two groups, and so the restricted locality of study 4 for logistical reasons was deemed to be acceptable to the purposes of the study.

Resource managers in the organisation were requested to identify six novices (grades 1 and 2) and six experts (grades 5, 6 or 7) who had not yet completed any of the three e-learning

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[9] Response rates for each business unit were MCS 80% (4/5); audit 55% (5/9); OR&S 57% (4/7).

[10] Personal communication with Gordon Ferris, a former partner in the participating organisation, December 2001.

applications used in studies 1, 2 and 3. This was to ensure that interviewee responses were directly related to the task and feedback examples used in this study, and were not biased by recollections of previous engagement with the original applications. In practice, it was not possible to get an exact match of novices and experts, and level-of-expertise was spread more broadly than intended: the actual sample consisted of five novices, three intermediates (grades 3 or 4) and four experts. Because the e-learning applications were being rolled out to a strict timetable, resource managers were unable to provide access to additional novices or experts who had not completed the three original applications. Therefore, rather than reject the 'intermediate' candidates, their transcripts were analysed alongside those of novices and experts. Twelve candidates responded to the request for interview, giving a response rate of 100%.

5.2.5 SUMMARY

A summary for the samples obtained in each study is given in table 4.

		Interviewees			
	Title of e-learning application	**Interviewees' experience**	**Work demographics of interviewees**	**Number of inter-viewees**	**Resp-onse rate**
1	*Zentoria*	Recollection of responses to 3 activities taken from the e-learning application	Management consultants from UK and North American offices	29	85%
2	*Coaching Advantage*	*- as above -*	Management consultants from North American offices	13	90%
3	*Navigating the Grey*	*- as above -*	Management consultants, audit and operational research & support staff from North American offices	18	62%
4	N/A Storyboard activities constructed from the applications named above.	Real-time interaction with 5 e-learning activities contained in the Powerpoint storyboard.	Management consultants from London office	12	100%

Table 4: Interviewee sample used in each study

5.3 MATERIALS AND PROCEDURES

The strategy for selecting the e-learning applications for the four studies was presented in section 4.3.2. The main criteria were that the applications aimed to develop employees' problem-solving skills, and that they contained scenario-based activities to enable learners to practice those skills in the 'safe' e-learning environment. This section describes the selected applications and the specific activities which were discussed with interviewees. For all studies, the screenprints showing tasks and activities are shown in Appendices E to H.

In studies 1, 2 and 3, which were exploratory, interviewees were asked to comment on each activity, using the screenprints to prompt recall of the original experience of completing them. In study 1, interviewees were additionally asked to rate the usefulness of the feedback, using a Likert scale where 1= not at all useful; 2 = not useful; 3 = slightly useful; 4 = useful; 5 = very useful. Having rated the examples, interviewees were asked for their interpretation of the term 'useful'. The Likert scale was found to have limited utility in the exploratory phase of research, and its use was not extended to studies 2 and 3, although it was reintroduced in study 4 to test the five hypotheses.

5.3.1 STUDY 1: ZENTORIA

Zentoria was introduced by the organisation in 1999 with the following aim:

> "This CBT introduces the [organisation's name] approach to Programme and Project Management. It is designed to provide new joiners and all existing consultants, directors and partners with a basic knowledge of the Programme and Project Management Methodology, the key activities involved, and an understanding of their roles and responsibilities" (*Course information provided to consultants by the Learning Resource Centre*).

Zentoria was well-regarded in the organisation and by the e-learning community, and was awarded an OMNI Intermedia award in 2000. The application combined tutorials, practice activities (including open questions and MCQs), and tests to gauge learners' project management knowledge before and after the training. The application included a 'Scratchpad', which acted as a screen-based notebook facility which learners were prompted to use to record responses to open questions. The storyline running through *Zentoria* was of a project team of consultants helping their client to develop an environmentally-friendly vehicle. Whilst the tutorials provided a principled grounding in project management principles, the practice activities portrayed scenarios and tasks relating to typical project management problems.

To provide focus for the interviews, three activities were selected for discussion. The selected activities each comprised an open question requiring a short-essay response followed by a different type of non-verificational feedback. The selection was motivated by an assumption that open questions were more suitable than MCQs in helping learners develop their project management skills, because open questions would encourage divergent thinking of a type suitable to the complex realities of project management. This assumption originated from my

own experiences of working at the organisation as a consultant and as a training designer, and was supported by the literature on student assessment (e.g. Rowntree, 1987).

Table 5 presents a summary of the activities.

Activity ref.	Scenario	Task	Feedback
ZEN1	Unauthorised extension to project scope	Open question	Model answer
ZEN2	Loss of confidence by project director in the calibre of the project team	Open question, accompanied by a finished example of a similar open question	Model answer
ZEN3	Preparation for the first meeting of a new project team	Open question	Presentation of some of the issues to consider

Table 5: Summary of activities used in study 1

5.3.2 STUDY 2: *COACHING ADVANTAGE*

Coaching Advantage was introduced by the organisation in 2000 with the following aim and intended audience:

> "Aim: The *Coaching Advantage* web-based training programme ... helps build knowledge and skills to coach staff effectively.
>
> "Audience: *Coaching Advantage* is recommended for MCS[11] coaches/staff managers, project managers, practice leaders and resource managers, to assist in both formal and informal coaching relationships." (*Course information provided to consultants by the Learning Resource Centre*).

The application was web-based, combined tutorials and practice multiple-choice questions ('MCQs'), and portrayed coaching scenarios using streaming multimedia and text. Learners' responses to the MCQs were followed by feedback which verified their responses, and then provided elaborative content such as an explanation for the correct response. Learners had to score a minimum percentage of correct answers in order to achieve accreditation for the training. The minimum percentage was pitched such that most learners passed first time; if they did not, learners could re-do modules as many times as necessary in order to achieve the minimum score.

Three activities were selected for discussion with interviewees on the basis that each contained different styles of verificational, elaborative feedback. Because the interviews were conducted after completion of the e-learning application, it was not possible to ascertain how interviewees had answered each question when they originally completed the training. The examples were introduced to interviewees by acknowledging that although the feedback might be different compared with when they competed the application for the first time, the important issue for this research was not the accuracy of their previous answer, but their impressions of the style of feedback which the example represented. The three activities are summarised below.

Activity ref.	Scenario	Task	Feedback
CA1	Coach practising the technique of 'advocacy' with his protégé	MCQ	Verificational, elaborative feedback for incorrect response, using video as well as text
CA2	Coaching discussion between coach and his protégé	Multi-step MCQ	Verificational, elaborative feedback for incorrect response followed by feedback for correct response, using video as well as text
CA3	Coach counselling his protégé about the latter's self-assessment profile	MCQ	Verificational, elaborative feedback for incorrect response, using text only

Table 6: Summary of activities used in study 2

[11] MCS = Management Consultancy Services.

5.3.3 STUDY 3: *NAVIGATING THE GREY*

Navigating the Grey was introduced by the organisation in 2000 for distribution to all employees in the organisation. The aim of Navigating the Grey is described in the following paragraph.

> "By reflecting on the interplay between our values and ethics, this self-paced CD-ROM will guide you through a number of scenarios that explore the grey areas we navigate in our daily professional lives. Upon completion of the course, you will be able to explain the relationship between [organisation's name] values and ethical behaviours in the workplace, recognize ethical issues in the workplace, and apply the decision-making framework when confronted with ethical dilemmas or questions in the workplace." (*Excerpt from course description)*

The application combined tutorials and practice MCQs, and made extensive use of digital video when portraying ethical dilemmas. Video was used extensively in the feedback to portray the probable consequences of the problem solutions represented by each of the MCQ response options. Learners were required to complete the course to gain accreditation, but did not need to achieve a minimum score (unlike in *Coaching Advantage*).

Three activities were selected for discussion. The procedures for selection and presentation to interviewees were the same as those for *Coaching Advantage*. The three activities are summarised below.

Activity ref.	Scenario	Task	Feedback
NtG1	Preparation of an e-business proposal, where a staff member is asked to divulge confidential information about a competitor who is also bidding for the work	MCQ	Verificational feedback for correct response, using video with minimal text
NtG2	Staffing of a new project team, where a staff member promised in the proposal is no longer available for the work	Multiple-step MCQ	Verificational feedback for several incorrect responses followed by feedback for correct response, using video and minimal text
NtG3	Offer of tickets to a baseball game by the client to a member of the consultancy project team	MCQ	Verificational feedback for incorrect responses, using text and graphics

Table 7: Summary of activities used in study 3

5.3.4 STUDY 4

Materials used in study 4 drew mainly on activities taken from *Zentoria*, *Coaching Advantage* and *Navigating the Grey*, and were constructed specifically to test the five hypothesis which were the focus of the study.

In order to test the hypotheses, it was necessary to provide interviewees with realistic activities which mirrored those they would typically encounter when completing an e-learning application. Five activities were designed for the purposes of this study - each to test a different hypothesis. Four activities were adapted from the e-learning applications used in studies 1, 2 and 3, whilst the fifth was created specifically for this research by two experienced project managers from the

participating organisation. The five activities were embedded in a PowerPoint hyperlinked file, and presented to interviewees in the form of a storyboard. Before the interview began, all interviewees were informed about procedures and then asked to describe in their own words their style-of-engagement going into the first activity. All interviewees were enthusiastic and used phrases which indicated a 'mindful' style-of-engagement. 'Mindful learning' is defined in this thesis as an intentional, considered approach towards e-learning materials; and a desire to learn, rather than merely 'pass a test' (see also section 7.3.1 in Part 4).

Each activity required the interviewee to complete a task and then receive feedback. In activities 1, 2, 3 and 4, two different styles of feedback were presented to interviewees in order to test hypotheses 1, 2, 3 and 4 respectively. Activity 5 required only one style of feedback to test hypothesis 5. Interviewees were observed whilst completing each activity, and before progressing to the next, they were interviewed and asked to comment on the content as well as the style of the feedback. Interviewees were questioned about their perceptions of both content and style. This was done to avoid them dismissing a feedback option solely because they disagreed with its specific content whilst at the same time liking its generic style.

Interviewees were asked to rate the perceived usefulness of each piece of feedback using the following Likert scale: 1= not at all useful; 2 = not useful; 3 = slightly useful; 4 = useful; 5 = very useful. Having rated the examples, interviewees were asked for their interpretation of the term 'useful'. An overview of the activities designed to test the hypotheses is presented in table 8.

Ref.	Activity, topic and hypothesis	Task	Feedback type and description
1	Project management ('scope creep') Hypothesis 1	Open question	1a) Non-verificational model answer Text; prescriptive statement of correct answer; concrete; dualistic
		MCQ	1b) Verificational & prescriptive Text; prescriptive; concrete; dualistic.
2	Ethics (client gifts) Hypothesis 2	MCQ	2a) Non-verificational & relativistic Text + still photographs of three commentators (wife, colleague and ethics helpline advisor) each giving their perspective on how to resolve the problem; relativistic
			2b) Verificational & dualistic in its implication that there was only one solution to the problem; explanatory plus description of the consequences of the selected response options
3	Project management (kick-off meeting) Hypothesis 3	OQ	3a) Concrete model answer Text; concrete "checklist" of actions to take
			3b) Conceptual model answer Text; conceptual "aide-memoire" of issues to consider
4	Ethics (racial harassment) Hypothesis 4	MCQ	4a) Verificational & experiential Video of the probable consequences of the selected response option
			4b) Verificational & analytic Text; analysis of the key learning points
5	Coaching (appraisals) Hypothesis 5	MCQ	5) Verificational with brief explanation Text; brief explanation but with no retrospective coverage to explain why the non-selected response options were correct or incorrect

Table 8: Summary of the activities designed to test the five hypotheses in study 4

5.4 CONTACT AND FOLLOW-UP

Administrative procedures and timings for contacting interviewees are summarised in table 9. The design of the contact protocols were influenced by Dillman (particularly his discussion of social exchange theory, e.g. Dillman, 2000: 4) - and by Frey and Oishi (1995), particularly their recommendation of the use of pre-letters and telephone pre-calls.

TIME LAPSE	ACTION (FOR EACH STUDY)
Seeking contact with interviewee	
Day 0 ↓	Email from point-of-contact in organisation to interview candidates (see example in Appendix A). Purpose: Ask candidates for their participation in a study of their experiences of computer-based training. Introduce the research study and its benefits to the organisation. Explain that a researcher from Imperial College will call shortly to request an interview.
+2 to 5 days ↓	Email from researcher to interview candidates. Purpose: Explain that the email follows-up on the email sent by the organisation. Ask candidates whether they are willing to participate in the study, and ask candidates to suggest convenient contact times. For studies 1, 2 and 3, include document containing screenprint images of the example activities to be discussed during the interview.
+5 to 14 days ↓	Follow-up email from researcher to interview candidates. Purpose: Second request for an interview.
+14 to 21 days ↓	Follow-up telephone call from researcher to interview candidates. Purpose: Third request for an interview.
Organising interview date	
0-2 days from contact from candidate ↓	Telephone call or email discussion with candidates willing to be interviewed, to arrange interview date, followed by interview.
-- INTERVIEW --	
Following-up after interview	
0-2 days from interview ↓	Follow-up email from researcher to interviewees. Purpose: Thank respondents for contributing to the research.
Months later ↓	Post-transcription email from researcher to interviewees. Purpose: Ask interviewees if they would like a copy of the transcript for comment. (A copy was sent to the three who requested one; no interviewees replied with request for changes).
Months later	Post-analysis email from researcher to interviewees. Purpose: Ask interviewees if they would like a copy of the research findings, for comment. (A copy was sent to the two who requested one; no comments were returned).

Table 9: Procedures for contact and follow-up with interviewees

The efforts described above for pre-interview contact proved to be very valuable. By being seen to make an effort to contact each candidate directly, by email or phone, I demonstrated a commitment to the research which I believe was respected by the people I sought to interview. I was careful to remain polite and accommodating, observing the limits of my position whilst requesting the voluntary interview. With the North American candidates, this meant that I actively offered interview times that were convenient to them locally, such as late afternoon Pacific Time, even though this was midnight GMT. These efforts seemed to be welcomed and appreciated.

I believe that pre-interview contact generated high acceptance to my request for an interview, as shown in the response rates presented in section 5.2.5.

5.5 INTERVIEW DESIGN

Chapter 4 discussed the reasons for selecting semi-structured interviews conducted by telephone (studies 1, 2 and 3) or face-to-face (study 4). The next step was to develop the schedule of questions to be used for each study. This section presents the prior research and methods literature which influenced interview design, and discusses the structure of the interview schedule and the design of questions, including those used to operationalise the constructs of 'useful' and 'level-of-expertise'.

5.5.1 GENERAL COMMENTS ABOUT INTERVIEW DESIGN, PILOTING AND CONTACT

Design

When designing interview questions, guidance was sought from empirical research. However, no studies were found which directly addressed learners' responses on receiving e-learning feedback. Two related studies which were potentially useful were Tait's (1998) study of student attitudes and reactions to the replacement of lectures by e-learning, and Roberts' (1996) study of Open University students' perceptions of feedback from tutor-marked and computer-marked assessments. Neither study looked specifically at *e-learning* feedback, but both included interview or survey questions concerning learner evaluations of feedback in a distance-learning context. These studies prompted the design and piloting of some of the questions for this research, such as the definition of the 'usefulness' of feedback.

The literature on methods was also consulted, particularly Foddy (1993), Wengraf (2001), Rubin and Rubin (1995) and Oppenheim (1992). Guidance from Wengraf was particularly helpful when structuring the interview schedule, to ensure that the technical phraseology of the research questions was translated into terms which would be meaningful for interviewees. Other authors influenced decisions regarding the balance between open and closed questions, the flow from general to specific questions, the stripping out of technical jargon and leading questions which were not part of an intentional strategy, and the piloting of interview questions and procedures.

Piloting

On completion of the draft questions, a pilot study was conducted for study 1 (discussed in section 4.2.2), and later, draft questions were also piloted for studies 2, 3 and 4. These provided an opportunity to test the questions and the introductions to each feedback example for clarity, comprehension and relevance before committing to the interview schedules. It is also important to note that interviews were designed to be semi-structured and to encourage discussion around interviewees' opinions and experiences. Questions were therefore used to ensure that the aims of each study were adequately met, and on occasion, this meant that additional non-scheduled questions were asked in order to probe interviewees' comments for further clarification.

Contact

The priority in the first few minutes of each interview was to build a sense of rapport and to enable interviewees to feel comfortable about the ensuing interview. Interviewees were informed of the purpose of the research, and told that their comments would be treated in confidence. Permission was asked to tape-record the interviews. I also informed interviewees of my position as a previous employee of the organisation. However, to avoid prejudicing interviewees' comments, I did not divulge my involvement in the design of *Zentoria*.

5.5.2 INTERVIEW STRUCTURE FOR STUDIES 1, 2 AND 3

In studies 1, 2 and 3, interviewees were asked about their recollections of activities (tasks + feedback) in a previously-completed e-learning application. Sequencing of questions was flexible, allowing for the natural flow of conversation, and the majority of questions were open. The interview was structured into four parts:

Part A Learner's level-of-expertise and other attributes;

Part B Learner's objectives for completing the e-learning application, and general comments about the e-learning application;

Part C Learner's comments on three specific instructional activities included in the e-learning application;

Part D Learner's comments on a broader range of questions, including their definitions of 'useful' feedback.

Parts A, B and D were short and relatively focused, whereas part C aimed to explore interviewees' experiences of the feedback examples.

Part A: Level-of-expertise and other attributes

The principal aim of part A was to ascertain interviewees' level-of-expertise. In addition, interviewees were asked how long they had worked at the organisation, their age (using groupings such as '31-35'), and their business unit.

The measurement of expertise was problematic, in part because the nature of expertise is itself a topic of continued debate. For much of the last century, expertise was presumed to be an individual attribute, yet several contemporary critiques of this presumption have pointed to a neglect of the social dimension of expertise. For example, it is argued that expertise and knowledge may be "distributed" (Salomon, 1993) amongst teams of people who cannot achieve individually what they can achieve as a team. Another argument is that experts are socially-selected and historically-situated (Agnew et al., 1997). Whilst recognising the existence of debate about the very nature of expertise, this thesis adopted the cognitivist assumption that expertise resides in the individual.

Since one of the aims of this research was to identify differences in the way learners, of varying levels-of-expertise, responded to feedback, it was important to identify a suitable proxy for interviewees' level-of-expertise. Several measures were considered, and are discussed next.

Organisational grade

In an organisational setting, an employee's grade is often awarded on the basis of internal appraisal systems and prior experience. A grade sums up an employee's perceived capability within an organisation, and can be interpreted as a proxy measure of expertise. In the organisation which participated in this research, the grading scales of the three business units[12] were identified along a 1 to 7 rating scale, where 1 represented a novice 'new entrant' to the organisation and 7 represented an expert, usually a partner who had overall responsibility for managing client relationships as well as the quality of project deliverables.

Self-assessment ratings

In order to verify the consistency of the organisation's grading, consideration was given to asking interviewees to make a self-assessment of their level-of-expertise in the training subject. The three subjects were project management, coaching, or business ethics. Research literature was reviewed to identify questions of this type which had been successfully used. None was found, although a related question was identified in a postal survey to evaluate a CD-ROM application (Whitelock, 1989). In the survey, learners were asked for a self-assessment of competence at using a computer with the question "how skilled do you think you are at using a computer?". In response, five options were given (5=Expert, 4=Advanced, 3=Competent, 2=Novice, 1=Never used until S103). No explanations of the terms were offered.

Following this style, interviewees in the pilot study were offered a five-point Likert scale with semantic terms taken from Dreyfus and Dreyfus (1986) for each point on the scale (i.e. 5-Expert; 4=Proficient; 3=Competent; 2=Advanced Beginner; 1=Novice). During the pilot telephone interviews it became apparent that interviewees found the question format too lengthy and wordy, and had trouble remembering all options before responding. A further attempt was made to obtain a self-assessment of interviewees' expertise, by re-phrasing the question to "how would you rate yourself in project management on a scale of 1 to 5, where 1 is 'very little experience', and 5 is 'expert'". However, when cross-checked against two supplementary questions about number of years of business and subject-specific experience, it became obvious that some interviewees, particularly those with low organisational grades, over-rated their level-of-expertise. It was therefore decided to use the organisational grade as the proxy for expertise.

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[12] Management Consultancy Services, Audit, and Operational Research & Support.

Applying the organisational grade

For studies 1, 3 and 4, interviewees were categorised as follows:

Grades 1 & 2	Novice
Grades 3 & 4	Intermediate
Grades 5, 6 & 7	Expert

For study 2, which was based on *Coaching Advantage*, the above categorisation scheme was modified to account for the fact that no employees could become coaches until they had attained grade 3 or above. Therefore, for study 2, interviewees were categorised in the following way:

Grade 3 or below	Novice
Grades 4 & 5	Intermediate
Grades 6 & 7	Expert

A shortcoming of this method is that the organisational grade reflected an interviewee's general level-of-expertise in providing professional services, and was not specific to the subject matter of the e-learning application. However, the skills of project management, coaching and business ethics are important elements contributing to the organisation's assessment of an employee's competency (Ferris, G. [former partner in the participating organisation], personal communication, December 2001).

Part B: Learners' objectives and general comments about the e-learning application

Part B was constructed to meet two aims. The first was to gauge learners' objectives when beginning the application. A review of prior educational research had indicated that learners' orientations and approaches to study influence their expectations of the utility of the material and their level of effort when engaging with it (e.g. Dweck & Leggett, 1988; Dweck & Elliott, 1983; Marton & Saljo, 1976, 1986; Entwistle, 1988). In anticipation of a possible relationship between learners' initial motivations and their experiences of e-learning feedback, all interviewees were asked about their reasons for doing the training.

The second aim of Part B was to establish whether interviewees had especially strong opinion about the specific e-learning application from which the activities were taken. Therefore, interviewees were asked about their overall opinions of the application. In doing so, the aim was to ask what Rubin and Rubin (1995: 214) call a "slant" question which indicates an interviewee's predisposition towards the topic of conversation. By asking the question upfront, it also allowed interviewees who were strongly positive or negative about the application to 'let off steam'. For example, one interviewee [Z10] spoke with vociferous derision about the 'camp humour' which was present in parts of *Zentoria* (but not in the feedback); yet once that point was made, he continued in a manner which was considerably more reflective and thoughtful.

Part C: Learners' comments on three activities included in the e-learning application

The interview questions in part C aimed to contribute to an understanding of the research questions outlined in the previous chapter. The phraseology of the research questions required an exploration of learners' subjective experiences - of their "expectations" and their "outcomes" on receiving feedback. However, the research aim was not simply to produce descriptive accounts of those experiences, but also to begin to explain them by identifying "influences", particularly those that seemed stable across groups of learners of the same level-of-expertise.

For each feedback example, interviewees were first asked to comment on their recollections, using the screenprints to aid recall. Thereafter, interviewees were prompted to be more specific, using questions drawn from the interview schedule. Interviewees were encouraged to elaborate on their answers, and a discursive interview style was adopted to allow interviewees the opportunity to fully describe their subjective responses. This meant that questions were asked in a sequence which was adapted to the flow of conversation. It also meant that on occasion, questions were omitted to avoid duplicating a comment which an interviewee had volunteered unprompted. In these situations, the questions were used more as a checklist to ensure that the main issues were covered.

The questions relevant to Part C are presented in table 10 below.

Questions relating to each example
What were your overall impressions of this activity?
What did you think of the feedback? (prompt for comments on style and content)
What made the feedback useful?
What would have made the feedback more useful?
Are there ways the feedback could be improved?
Did you feel anything was missing from the feedback? What would you prefer to have?
Was the feedback pitched at the right level / appropriate for your level of expertise?
Question relating to comparison across all examples
Thinking back to all three feedback examples, which did you prefer? Why?

Table 10: Questions used in Part C of the interview schedule for studies 1, 2 and 3

Part D: Learners' definition of 'useful', and their comments on broader issues

The term 'useful' was introduced in questions asked in Part C of the interview schedule. It was important to understand how interviewees had interpreted this term in the context of the questions asked. By asking interviews how they defined 'useful' *after* they had already discussed the usefulness of feedback, they were able to reflect on their actual usage of the term. Questions to elicit learners' definition of the term 'useful' are discussed below, followed by comments on other questions used in Part D.

Learners' definition of 'useful'

Several options were considered for operationalising the concept 'useful' in order to compare learners' use of the term and to identify patterns in their expectations of feedback. Four options were considered:

1. Take a phenomenological approach to the concept of 'useful'. However, given the research approach of obtaining the perspectives of a large number of interviewees, a phenomenological approach was considered to be unsuitable since it would rely upon intensive interviewing of a small number of people.

2. Use a questionnaire approach, and ask interviewees to rate a battery of scale items, each representing a different semantic aspect of the term 'useful'. This approach would support factor analysis and other statistical techniques to identify patterns in interviewees' opinions of the term 'useful'. The problem with this option was the lack of a validated, scaling instrument (known to the researcher) to operationalise the term 'useful'.

3. Use a single closed question. A review of the relevant literature revealed that single questions had been used with 5-point of 7-point scales in research by Whitelock (1989) and Fulk (1993).

4. Use a single open question, asking interviewees for their definition of the term 'useful'.

Use of a single closed question (option 3) was adopted in studies 1 and 4. Interviewees were asked to rate the usefulness of each feedback example using a Likert scale[13], thereby allowing for global comparisons between feedback examples. However, the limitations of this approach became apparent during study 1: global averages on the perceived usefulness of each example told nothing about *why* it was useful, nor why variability existed between the ratings of each interviewee. This question was not therefore asked in studies 2 and 3. However, the question was reinstated for study 4 in order to test that study's hypotheses.

An alternative question used in all studies was to pose an open question (option 4), asking interviewees for their qualitative comments on the usefulness of the feedback examples as a means to investigate their expectations of the function of feedback. Having considered and commented on all of the feedback examples, interviewees were asked "overall, for the type of activities you completed in [name of application], what makes feedback useful?" This question was successful because it prompted qualitative comments indicating interviewees' interpretations of the function of feedback.

An analysis of interviewees' quantitative ratings and qualitative comments is presented in Part 4 of this thesis.

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[13] The Likert scale contained five points: 1 = not at all useful; 2 = not useful; 3 = slightly useful; 4 = useful; 5 = very useful.

Learners' comments on broader issues

Interviewees were also asked a number of broader questions to establish their previous experience of e-learning and to elicit their general opinions on e-learning. Questions asked in Part D are presented in table 11.

Overall, for the type of activities you completed in [name of application], what makes feedback useful?
How many e-learning applications have you completed in the past? Were they any which you particularly enjoyed or did not like?
What do you think are the advantages and disadvantages of e-learning?

Table 11: Questions included in Part D of the interview schedule for studies 1, 2 and 3

In addition to the above, study 1 also asked interviewees to comment on several styles of non-verificational feedback which were proposed as alternatives to model-answer feedback. The interview schedule for study 1 is presented in Appendix B. The schedules for studies 2 and 3 were modelled on the study 1 schedule, except that each contained different introductions to the e-learning activities. The introductions for studies 2 and 3 are presented in Appendix C.

5.5.3 INTERVIEW STRUCTURE FOR STUDY 4

In study 4, interviewees were requested to interact with five e-learning activities. The activities were constructed using new material from the three e-learning applications used in previous studies. The activities were presented using a storyboard developed in a PowerPoint file, and using a laptop computer taken to the site of each interview . The interview question covered three areas:

Part A Level-of-expertise and other attributes;

(no part B, because interviews did not relate to a specific e-learning application)

Part C Learner's comments and ratings for the five activities;

Part D Learner's comments on a broader range of questions, including their definitions of 'useful' feedback.

In many respects the questions asked in study 4 resembled those in previous studies, although greater emphasis was given to eliciting interviewees comparisons of the feedback styles in order to investigate the hypotheses which prompted this study. More information on the materials and procedures used in study 4 are presented in chapter 8. The interview schedule is presented in Appendix D.

5.5.4 INTERVIEWER RELIABILITY

The processes of preparing the interview schedule enabled me to familiarise myself with the language and questions I wanted to use, and to clarify my objectives in conducting the interviews. It was also important to ensure that when conducting the interviews, the questions were communicated in a manner which would maximise the likelihood that they would be understood in the same way by all interviewees (Rubin & Rubin, 1995). I therefore adopted a strategy of allowing some flexibility in the phrasing and sequencing of questions so as to adapt to the flow of conversation. I also allowed interviewees to elaborate on their answers, since this ensured I could understood their answers in the context of their own experiences. My knowledge and experience of the working culture was a resource that I drew upon when building relationships with the interviewees, but I took care to avoid revealing my own opinions of the organisation, its training practices, or the individual applications.

5.5.5 TRANSCRIPTION PROCEDURES

With interviewees' permission, all interviews were recorded. On the basis of transcription guidelines prepared by myself, I transcribed 48 interviews, and 24 were transcribed by 2 professional transcribers. I re-checked all transcripts, including my own, by listening to the original tape-recordings of the interviews whilst reading the transcripts, and made amendments where appropriate.

5.5.6 DISCUSSION RELATING TO INTERVIEW DESIGN

Reflecting back on the design of the interview schedule, I found the most illuminative questions to be those which were open, and which prompted interviewees to think comparatively. Examples of the latter were questions prompting interviewees to compare the perceived effectiveness of feedback designs, or to compare their outcomes on receiving feedback with what they would have expected from a tutor in a class environment. Interviewees' use of the Likert scale in study 1 to rate the usefulness of feedback examples was not as helpful as anticipated, as discussed in section 5.3. The scale was re-introduced in study 4 to enable the hypotheses to be tested using a traditionally-recognised (i.e. numerical) method, although in practice the *relative* ratings (indicating interviewees' preference for one of the feedback alternatives) were more meaningful than the absolute ratings.

5.6 ANALYTIC PROCEDURES

The previous chapter presented considerations leading to the selection of analytic methods. This section supplements that discussion by describing the procedural steps taken. A sequential presentation of procedural steps provides a clear explication of each step and is the style used in this section; however, it underemphasises the continual iteration which took place between each step, which was also an important feature of analysis in this research.

There were three phases to the analytic strategy which was followed in this research, each of which used different software tools and pursued different aims. The three phases are described below, and include an account of my experiences of the benefits and limitations of NVivo, and the ways I attempted to overcome its deficiencies. This is provided with the intention that my reflections on using NVivo may contribute to the growing debate about how to use code-and-retrieve tools most effectively (e.g. Coffey et al., 1996; Marshall, 1999, 2000; Gilbert, 2001). To provide a context for the procedures, this section begins by introducing the analytic strategy.

5.6.1 ANALYTIC STRATEGY

The research questions which framed this study required an exploration of learners' *expectations* of, and *responses* to feedback, and the *influences* relating to those experiences. The intention was to analyse learners' subjective perspectives, and through doing so to identify patterns and themes across their experiences which could be conceptualised in meaningful ways. This required a strategy capable of two processes. The first was to fragment each transcript into discrete units (i.e. pieces of interview text) representing aspects of the learner's experiences such as his or her response to a particular feedback example. The second was to combine those units with equivalent units from other transcripts in the search for common themes or points of difference. This second process allowed for an analysis of how themes transcended multiple interviews. Although loss of context is an inevitable outcome from fragmentation, NVivo has the facility to reconnect any unit of text back to the original transcript text with only two key-strokes, thereby allowing each unit to be re-contextualised as an aid to interpretation.

The strategy of fragmenting, re-combining and re-contextualising units of data facilitated an analysis of common patterns relating to learners' experiences of feedback, and the influences relating to those experiences.

The next section describes the three phrases of analysis.

5.6.2 PHASE 1: ORIENTATION AND FAMILIARISATION

Transcriptions of the interview audio tapes were produced in Microsoft Word[14] using procedures described in section 5.5.5.

Following recommendations by several authors on methodology (Rubin & Rubin, 1995; Tesch, 1990; Dey, 1993), transcripts were then read to gain familiarisation with the kaleidoscope of issues raised by interviewees. Margin notations were made to highlight salient interviewee comments, and to note potential themes.

5.6.3 PHASE 2: FRAGMENTING AND CATEGORISING THE DATA

In preparation for phase 2 of analysis, Word files for each transcript were imported into NVivo. Each transcript (represented as a single NVivo document) was coded with the principal attributes describing each interviewee:

- Gender
- Organisational grade
- Office location (UK or North America)
- Business Unit
- Number of years at the organisation
- Age
- Number of e-learning applications previously completed

Once in NVivo, transcripts were analysed using the method of open-coding described in the previous chapter. This was done by using the software's 'browse' functionality to identify and highlight units of text which represented different themes and concepts, and then using NVivo's 'coder' functionality to tag the text with a code reflecting the theme or concept it represented. To reduce the bias of prior assumptions about what the transcripts might contain, all codes were created inductively and without using an *a priori* coding template.

The process of open-coding demanded close concentration, and required immersion in the data at a detailed level. I was aware of the risk of what Richards (1998) has called the "seduction" of close access to the original text. To avoid what has become known as the "coding trap" (Gilbert, 2000), I devised a strategy to ensure that I developed a framework of relevant codes at an early stage. The strategy involved coding six or seven transcripts using NVivo, and then representing all new, existing or modified codes in a structured way using the concept-mapping facility in MindManager. By doing so, I was able to explore code relationships, eliminate duplications, check for apparent 'gaps' (which would prompt re-examination of the data), and become sensitised to emerging themes represented by NVivo codes. I also recorded memos in NVivo to document my interpretations, and discussed my interpretations with a fellow PhD student in order to debate points of agreement and difference to enable me to refine my

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[14] Microsoft Word is a product of Microsoft Corporation, http://www.microsoft.com

interpretations. The latter procedure is discussed on page 111. Throughout this process, and using techniques such as 'constant comparative method' which were introduced in the previous chapter, the coding template developed to reflect my increasing sensitivity to the data.

The output from these activities was an indexation of codes of the type described by Miles and Huberman (1994) as "first-level coding". Such codes fragmented the data in ways which were initially descriptive rather than interpretive, but which could later be recombined and shaped into patterns which conceptualised the data in a more holistic and abstract manner.

Identifying the core process

By analysing the data from study 1, I began to identify the core process representing the main theme of the research. In this research, the core process which underpinned interviewees' experiences of feedback was one of *inquiry* (generated by the preceding task) followed by *closure or non-closure* (on receiving the feedback). The concept of closure is introduced in section 6.3 in the next chapter.

Progressing from first-level coding to pattern-coding

Having identified the core process, I began to move from "first-level coding" (Miles & Huberman, 1994) to a more interpretive level of analysis. Still working *within* NVivo, codes were grouped which represented important themes in preparation for further analysis. Some codes were not grouped if they seemed to be of only incidental importance to the main themes which were emerging.

During analysis of studies 2 & 3, I was able to build on the ideas and coding template developed in study 1, and categorise some of the major components of the core process of *inquiry and closure* - such as learners' *outcomes* on receiving feedback. Using NVivo's search-and-query functionality, I continued to refine my understanding of the relationships between the main themes, and developed a conceptual framework representing those themes.

5.6.4 PHASE 3: SEARCHING FOR PATTERNS WITHIN AND BETWEEN LEARNERS' EXPERIENCES

Having completed phases 1 and 2, a considerable amount had been achieved in terms of fragmentation and conceptualisation of the data, and I had developed a sensitivity to the data and to the variability and similarities in interviewees' experiences. NVivo had facilitated the development of a conceptual framework which I wished to investigate further. NVivo's 'search-and-query' facility supported this process, but was insufficient by itself. Furthermore, I was aware that a risk of working solely *within* NVivo is that it can lead to a temptation to stay too close to the original text without achieving the distancing which is the precursor to theorising.

Therefore three additional procedures were developed to facilitate a deeper understanding of the interviews through further analysis of the codes and their relationships. The procedures were to:

- summarise interviewees' experiences;
- transform qualitative data into numerical equivalents for interaction analysis;
- discuss the interpretations with other researchers.

Each of these procedures is discussed in the following sections.

Creating summaries

Using Microsoft Word, I mapped relationships between interviewees' outcomes for each feedback example and the attributes of feedback which seemed to have influenced those outcomes. An example of an 'outcome table' is presented in Appendix I[15]. The process of re-reading transcripts facilitated a refining of the conceptual framework, and an understanding of how feedback's attributes influenced interviewees' outcomes; for example, it enabled me to identify the importance of the concept of 'assessment of personal risk', which is introduced in section 6.3.

Transforming qualitative data

The process of creating the outcome tables enabled me to conduct a *micro*-level analysis of each transcript. A rather different strategy was required to identify interaction-effects at a *macro*-level between interviewees' styles-of-engagement, outcomes, level-of-expertise and business unit.

Using NVivo's search-and-query facility, matrices could be created showing the frequency of codes for each interviewee, e.g. showing the number of times the transcript for interviewee 'X' had been coded as 'mindful style-of-engagement'. Such matrices could be quickly produced, and indicated areas of potentially fruitful analysis which were then explored by browsing the original text. However, in some circumstances, I felt that a simple frequency of coding instances was a misleading representation of the quality of interviewees' experiences. I therefore developed an alternative procedure to manually categorise, for each interviewee, their outcomes for each feedback example, and their style (or styles) of engaging with the application. This manual categorisation drew on the NVivo matrices, qualified by a re-reading of the transcripts.

To facilitate numerical interaction analysis, the categories were then transformed into numerical weightings. Transformations were based on the position of each category along the conceptual

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[15] Outcome tables were completed for each interviewee for studies 2, 3 and 4, but not for study 1 because a detailed analysis of learners' 'styles-of-engagement' and 'outcomes' on receiving feedback had not been undertaken at that stage.

dimension which differentiated the categories; for example, outcomes were weighted between -2 and +2 based on their inferred positions along the closure:non-closure dimension.

Procedures for manual categorisation and transformation are described in section 7.7.1. Using spreadsheet tabulations of the transformed data, an interaction analysis was conducted, which is presented in section 7.7.2. The tabulations are shown in Appendix J. The findings derived from transformations of qualitative data provided useful insights which could inform future research. However, recognising the limitations of data transformations (Boyatzis, 1998), they were used only to a small extent to present a different perspective on the data, but without using them to make firm predictions or recommendations.

Enhancing the credibility of the interpretations through discussion with other researchers

It was argued in the previous chapter that a strategy was required which achieved a balance between seeking full inter-rater reliability, or ignoring it to rely upon my own interpretations. I therefore approached another researcher who was willing to discuss my interpretations and who had a similar methodological orientation and knowledge of the same field.

The researcher identified was a doctoral student studying teachers' attitudes to e-learning at another university. We agreed that we would individually read and analyse selected interview passages using the same coding guidelines, and then discuss areas of agreement and disagreement.

Our discussions were useful and in general we agreed on many matters of substance. In those areas where there were differences, we discussed reasons for the differences and I used those learning points to review and reconsider my analysis. The discussions also allowed me to elaborate my understanding of the categorisations, because my co-analyst sometimes saw perspectives which I had overlooked.

From my discussions with other researchers it would appear that they share my concerns about the limitations of sole-researcher projects, and the consequent lack of a co-worker with whom to conduct regular and detailed discussions about all aspects of the data. Notwithstanding these comments, my extensive experience in the same field as the interviewees, and my disciplined approach contributed to the credibility of this research.

5.6.5 DISCUSSION RELATING TO ANALYTIC PROCEDURES

The combined use of several tools and procedures allowed me to make sense of detail and context, as well as idiosyncratic and shared patterns of experiences of e-learning feedback, and to represent relationships graphically. Throughout the period of research, I continued to examine relationships between NVivo codes and interviewee attributes using NVivo's search-and-query functionality, and made frequent reference back to the original transcripts. This enabled me to refine the developing conceptual framework, and to develop and test the hypotheses which became the focus of study 4. Procedures for analysing study 4 mirrored many of those for the exploratory studies (1, 2 and 3) described above.

5.7 ETHICAL CONSIDERATIONS

5.7.1 INTRODUCTION

Research ethics inform decisions on how to acquire and disseminate trustworthy information in ways that cause no harm to those being studied, be they interviewees (as in this research), or other informants (Rubin & Rubin, 1995: 93-4). Ethically-informed decisions need to be made at all stages of research, not just during the interaction with the participants. For example, at the early stage of research, judgements must be made about whether the research topic itself is too politically explosive, or too sensitive to warrant the political or emotional consequences (Robson, 1993: 29-31). At the closing stages of research, consideration must be given to whether communication of research findings is likely to be harmful to interviewees or other interested parties (Sapsford, 1999: 40). Honesty and openness with interviewees is an important guiding principle. Informed consent by respondents is key - although some have said that consent can never be fully informed (Sapsford, 1999: 42).

Ethical considerations which influenced this research are discussed next.

5.7.2 TOPIC

The research topic - interviewee's expectations of, and responses to e-learning feedback - was not believed to be politically or emotionally sensitive. The purpose of the research was to improve feedback and e-learning design, and interviewees seemed to welcome the opportunity to discuss the topic. One aspect of discussions which was potentially sensitive for a small number of interviewees was their perception of e-learning as an unwanted replacement of class-based training. However, this occasional sense of dissatisfaction was already acknowledged in the organisation.

5.7.3 INFORMED CONSENT

Research procedures included the sending of emails from the partner organisation to potential interviewees. The email informed them of the purpose of the research, and introduced me as a researcher who would be in contact to request an interview. Some candidates refused participation indirectly by not answering emails or phone calls requesting participation, or directly by sending emails giving 'decline' reasons such as heavy workload. In general, response rates were high, and interviewees were positive about becoming involved in the research.

5.7.4 CONFIDENTIALITY AND ANONYMITY

An informal confidentiality agreement was agreed with the organisation, covering how research could be referred to in external communications. The organisation also requested that I produce internal reports on the research findings for their own purposes. This was done for study 1, studies 2 & 3 (reported together), and study 4.

Anonymity was given to all interviewees. Interviewees were asked permission for me to tape the interviews and to allow for later transcription; none refused. All interviewees were offered a copy of the interview transcript and a copy of the internal report; 3 interviewees requested their transcript, and 2 requested the internal report, which were duly sent.

5.7.5 INTRUSIVENESS

Interviews were usually conducted during work hours, and so many respondents might have seen the interview time as an intrusion, delaying completion of their work. Therefore all the interviews were time-restricted to under one and a half hours, and were conducted at a time of their choosing.

5.8 CONCLUDING REMARKS

This chapter concluded Part 3 of this thesis by presenting the samples, materials and procedures through which data was collected and analysed. Lessons learned which might be relevant to other researchers, such as my experience of using NVivo, were also presented.

The next chapters of this thesis present the findings from the four studies which comprised this research.

PART FOUR

PRESENTING THE FINDINGS

INTRODUCTION TO PART FOUR

This research used different materials and strategies to explore learners' expectations of, and responses to e-learning feedback.

Materials included screenprints of activities from three e-learning applications which interviewees had recently completed, as well as a storyboard of activities presenting new feedback designs. Strategies included asking interviewees about: recollections of previous feedback experiences (prompted by screenprints); reflections on newly-created storyboard feedback designs; opinions of what was 'useful' in feedback; and opinions about what was 'missing' from feedback. From an ontological and epistemological perspective, these strategies provided different perspectives on the 'reality' of learners' experiences (Mason, 1996: 11).

As the research progressed, interpretation of findings suggested themes, concepts and relationships which could be combined in a conceptual framework to describe learners' expectations and responses. Components of this conceptual framework are introduced throughout Part 4 in a way which indicates the evolution of the framework in response to findings.

The four studies which comprised this research investigated the following aspects of learners' experiences:

- Study 1 explored learners' responses to non-verificational feedback which followed open-question tasks. The study explored learners' experiences of inquiry during interaction with the task, and closure on receiving feedback.
- Studies 2 and 3 explored learners' responses to verificational feedback which followed MCQs. The studies explored four aspects of the framework: learners' sense of participation in the task; learners' styles-of-engagement with the e-learning application; learners' outcomes on receiving feedback (and the degree of closure which those outcomes represented); and the attributes of feedback which influenced learners' outcomes. Relationships between outcomes and the attributes of feedback were also investigated, and contributed to the development of five hypothesis relating to learners' responses to variations in the attributes of feedback.
- Study 4 tested five hypotheses generated from studies 1, 2 and 3.

The three chapters in this section present the findings from the studies. Chapter 6 discusses study 1; chapter 7 discusses studies 2 and 3; and chapter 8 discusses study 4. The characteristics of each study are summarised in table 12.

	Chapter 6 Study 1	Chapter 7 Study 2	Chapter 7 Study 3	Chapter 8 Study 4
Research strategy	Exploration	Exploration	Exploration	Hypothesis-testing
# of interviewees	29	18	13	12
Interviewees' business units	Management Consultancy Services ('MCS')	MCS	MCS, audit practice, and operational research & support	MCS
Interviewees' home offices	UK and North American	North America	North America	UK
Materials used	Screenprints of three activities from *Zentoria*, a project management e-learning application	Screenprints of three activities from *Coaching Advantage*, a coaching development e-learning application	Screenprints of three activities from *Navigating the Grey*, a business ethics e-learning application	Storyboard of five activities. Four activities were adapted from *Zentoria, Coaching Advantage* or *Navigating the Grey*. One activity was designed specifically for study 4.
Type of activity	Open questions; non-verificational feedback	Multiple choice questions ('MCQs'); verificational feedback	MCQs; verificational feedback	Open questions and MCQs; non-verificational and verificational feedback
Data collection methods	Telephone interview	Telephone interview	Telephone interview	Face-to-face interview and observation
Data collection strategies	Explore interviewees': • recollections and comments relating to three activities; • opinions of nine non-verificational feedback designs	Explore interviewees': • recollections and comments relating to three activities	Explore interviewees': • recollections and comments relating to three activities	Investigate interviewees': • comments on five storyboard activities

Table 12: Characteristics of the four studies conducted for this research

Abbreviations are used to identify interviewees and to identify the example activities which formed the basis of interview discussions. The following abbreviations are used:

Study	Name of source e-learning application	Interviewee designation	Activity
1	Zentoria	Z1, Z2 ... Z29	ZEN1, ZEN2, ZEN3
2	Coaching Advantage	C1, C2 ... C18	CA1, CA2, CA3
3	Navigating the Grey	N1, N2 ... N13	NtG1, NtG2, NtG3
4	N/A - Storyboard activities	SF1, SF2 ... SF12	(1a) & (1b); (2a) & (2b); (3a) & (3b); (4a) & (4b); (5)

Table 13: Conventions used to identify interviewees and activities

CHAPTER SIX
ANALYSIS OF STUDY 1

6.1 INTRODUCTION

This chapter presents the findings from study 1, which involved twenty-nine interviewees from the UK and North American offices of the organisation. Section 6.2 begins by considering the influence of 'office location' as an influencing variable on learners' responses to feedback. Section 6.3 then describes interviewees' recollections and comments on the tasks which preceded the feedback. In this study, interviewees identified that their sense of inquiry generated by the task influenced their expectations of feedback, as well as their responses to feedback. Interviewees' sense of closure on receiving the three *Zentoria* feedback examples are discussed in section 6.4.

The three *Zentoria* examples which were selected each represented a different style of non-verificational feedback which followed an open-question task. Two of the feedback examples were styled as model answers. The first two interviewees indicated that model answers were deficient in several respects. These early findings resulted in the inclusion to the interview schedule of two questions relating to what interviewees perceived as 'useful' in feedback, and what they perceived as generally 'missing' from feedback. Interviewees' responses to the two questions are discussed in sections 6.5 and 6.6 respectively. Additionally, interviewees were asked to rate nine styles of non-verificational feedback which could potentially follow open-questions. Interviewees' preferences are discussed in section 6.7.

Findings from study 1 indicated that there were several factors common to most of the interviewees in their quest to achieve closure on receiving feedback. These factors seemed to influence each other in a systemic way. This chapter concludes by proposing a nascent conceptual framework representing these factors and indicating the way in which they influenced learners' expectations of, and responses to feedback. In studies 2 and 3, this conceptual framework was developed and expanded.

6.2 INFLUENCE OF 'OFFICE LOCATION' AS AN INDEPENDENT VARIABLE

It was argued in the methodology chapter that learners' level-of-expertise was likely to be an important variable influencing learners' responses to feedback. To investigate this proposition, the research actively sought out learners of varying expertise in order to compare their responses to feedback. However, taking a broader perspective, this research needed to determine whether - for the sample selected - 'contaminating' factors existed which significantly modified the influence of level-of-expertise. This question was raised in recognition that interaction effects are complicating factors in any analysis, and that individual and socio-cultural differences are important influences on processes of learning.

The research design sought to reduce the impact of contaminating factors, for example by limiting the scope to the UK and North American offices of a single global organisation which actively fostered a homogenous workplace culture. However, an important question for study 1 was whether the geographic location of learners' home office - UK or North America - influenced their responses to feedback.

An investigation was therefore carried out to seek evidence of differences. Analysis of interview transcripts found two minor differences, which are discussed below.

- Interviewees differed in their opinions of the role of e-learning in the training curriculum: UK interviewees were more likely to express concern that e-learning might "take over" from class-based training, whilst American interviewees were comfortable with e-learning as an important tool in their training curricula.
- In the ranking of average ratings given to the non-verificational feedback designs (discussed in section 6.7), seven of the nine ratings were within one or two positions of each other; however, two designs were three to four positions apart: 'best practice' (NAm = 5th; UK = 9th); and 'peer debate' (NAm = 9th; UK = 6th).

A greater difference was that interviewees' numerical ratings of the three feedback examples showed that North American interviewees tended on average to rate each example between 0.5 and 0.6 points higher than the UK interviewees. This trend was repeated within each 'grade' grouping, but with a narrowing difference as level-of-expertise increased.

	Zentoria feedback example		
Home office location	ZEN1	ZEN2	ZEN3
UK	3.3	3.0	3.2
North America	3.9	3.5	3.8

Table 14: Comparison of average ratings for Zentoria feedback examples, given by UK and North American interviewees

However, interviewees from the two office locations did not materially differ in their *comparative* evaluations of the three feedback examples. Furthermore, interviewees' qualitative comments about the three feedback designs revealed no significant differences which could be attributed to location. With regard to interviewees' comments on what was generally useful or missing in feedback, no significant differences attributable to office location were identified.

Following the above analysis, it was concluded that the influence of office location was not a material differentiator between the experiences of UK and North American interviewees[16].

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[16] Analysis of study 4, which used e-learning applications designed in the North American offices, indicated that some UK interviewees perceived the activity scenarios to be more relevant to a North American context than a UK context. See section 8.7.1.

6.3 IMPORTANCE OF THE TASK IN INFLUENCING LEARNERS' EXPECTATIONS OF FEEDBACK

6.3.1 THE PROCESS OF INQUIRY FOLLOWED BY CLOSURE

An important finding to emerge was that learners' expectations of feedback were related to their *sense of inquiry* and their *assessment of personal risk* ('APR') generated by the immediately-completed task. The influence of sense of inquiry and APR are discussed in sections 6.3.2 and 6.3.3, respectively. A third influence on learners' expectations of feedback for any given task were their *generic expectations* of what constitutes 'good' feedback. These are discussed in sections 6.5 to 6.7.

On receiving feedback, the extent to which learners' expectations were met generated a sense of closure or non-closure. Findings indicated that learners' experiences of inquiry and closure were infused with a degree of mutual tension and co-dependency: the intensity of the sense of inquiry and of personal risk correlated with the intensity of the perceived need for closure to the questions and issues raised in their minds by the task. On occasion, a sense of inquiry was generated by the feedback itself, such as when feedback generated feelings of cognitive dissonance, or challenged learners' assessment of the adequacy of their knowledge.

6.3.2 LEARNERS' SENSE OF INQUIRY

Findings indicated that when approaching a new task, interviewees evaluated their interest in the task and their expectations regarding the subsequent feedback in order to determine how they would engage in fulfilling the task requirements. This is described as their sense of inquiry. Interviewees' sense of inquiry was generated amongst other factors by tasks perceived as *relevant* to the workplace, *challenging*, and *participative*. Such tasks prompted questions in the mind of the learner, creating specific expectations of feedback.

The importance of relevance and challenge are discussed in the following sections; the importance of learners' *sense of participation* when engaged with the task is discussed in chapter 7, since its importance was most significant during studies 2 and 3.

Relevance

Findings indicated that if interviewees perceived the scenario and task to be relevant to their work context, the activity as a whole was likely to be judged as interesting and potentially useful, and was likely to generate questions for which interviewees sought answers from the feedback. Interviewees' ability to relate to the scenarios was also important. For example, interviewee Z3, talking about the scope creep problem in ZEN1, commented:

> "I've encountered quite a few scope creep problems, or potential scope creep, on my previous project, so it was something I could very clearly relate to ... With any training, there's a question of do you do the training before you do the work, or do you do the work before you do the training, and I find that it's often easier if you can relate to the examples when you're doing training - you can picture it so much more. ... I found this exercise most useful because I could relate an awful lot of it to what had just happened on my previous project". [Z3]

Scenarios were also perceived to be relevant if interviewees believed they *might* encounter similar situations in the future. However scenarios rarely captured interviewees' interest unless they were perceived as relevant in the short-term. *Potentially*-relevant scenarios seemed to generate a sense of inquiry which was more intellectual ("I ought to know") than emotional ("I need and want to know").

However, a task perceived as relevant did not necessarily prompt effort or mindfulness on the part of interviewees unless the task was also perceived as challenging.

Challenge

Findings indicated that for most interviewees, 'challenge' translated into two requirements: a task that was engaging but also achievable; and an expectation that responses to the task would be verified.

A prerequisite to interviewees' sense of challenge was their belief that the task was engaging and that the requirements were achievable. Several interviewees commented that the open-ended questions (ZEN1 and ZEN3) left them confused rather than challenged. Faced by a question of the type "given this problem, what would you do?", some interviewees were unsure how they were supposed to respond; for example, were they supposed to think about short-term reactions or long-term goals?

> "[Example 1] was a blank sheet of paper - you didn't really know quite what they were getting at". [Z13]

Interviewees' indicated that when the task requirements were vague or over-ambitious, this lead to a loss of self-efficacy and a reluctance to commit effort towards completing the task. Being less engaged with the task, some interviewees used the feedback as new instructional content.

> "[When I was presented with the open-question] I did try to think of things. I was trying to make myself think. But a lot of times I remember just giving up and thinking 'I don't know what they're looking for' because my guesses never really went with the feedback. I was never right-on, so I thought 'I might as well read what they tell me instead of bothering to think anymore' ". [Z7]

Two options to improve task design were suggested: the first was to give prompts or hints about the type of response required; the second was to make more use of 'worked example' open-questions of the type used in ZEN2.

> "I felt it would have been more useful if you'd had something prompting you in the right direction, to help you achieve ... Maybe some sort of button to go off and give me a bit of help, about what I'm supposed to consider.... The feedback didn't stay with me as much as if I'd managed to generate [an answer] myself". [Z4]

> "[Because the activity for example #2 was partly filled in], it makes you think, and then try to follow through. It just made you go through the process of thinking ... It gives you an idea of the level of detail, and the thinking process". [Z13]

Perhaps even more important in establishing a sense of challenge was the expectation that responses to the task would be assessed by the computer. Several interviewees indicated that if they were to actively engage with the task by following the instructions and answering them to the best of their ability, their effort should be recognised by a proper assessment of their response. Many interviewees in study 1 were disappointed with non-verificational model-answer feedback, and few were satisfied with having to use model answers for *self*-assessment purposes. Some interviewees were particularly vociferous, stating that an open-question held no challenge unless there was an expectation that feedback would comment on their own, typed, response. They wanted to computer to 'mark' their response, and were rarely content with model-answer feedback.

> "I suppose because I'm competitive, doing something which is actually going to be assessed makes me put more effort into it". [Z8]

> "If it was possible [for feedback to mark one's responses] it would give people more motivation to actually think it through". [Z7]

Recognising that model-answer feedback was not specific to their typed response, many interviewees altered their engagement with open questions and thereafter made little or no effort to type their answers into the Scratchpad to record their response.

> "I wasn't a big fan of the Scratchpad. I didn't find it useful because there's no way to get direct feedback on what I'd written. I didn't find it useful to document my feelings - to document for the sake of documentation." [Z26]

> "Once I found out that I didn't have to type in something in there, then I didn't, and I just read what was there, and then went to the next screen." [Z6]

It became clear that the sense of inquiry generated by the task was a significant influence on interviewees' efforts towards completing the task requirements, and their expectations from feedback. Two important components of sense of inquiry were also identified: relevance and challenge. Sense of inquiry was further explored in studies 2 and 3, which lead to the identification of an additional influence - sense of participation. This is discussed in section 7.2.3.

6.3.3 ASSESSMENT OF PERSONAL RISK

For any given task, learners' assessment of personal risk ('APR') reflected their assessment of their capability to deal (in real life) with the problem represented in the task, and the implications of failure in a business setting. Comments from several interviewees indicated that their APR influenced their expectations of the feedback which followed the task. For example, interviewees with a high APR tended to want feedback to give clear guidance on how to deal with the problem in such a way as to minimise risk of failure.

"This was a really interesting one. I remember this because I was having a similar problem at the time. We were working with a difficult client. They insisted that one of the team leaders had agreed to implement another module. I had to deal with that. It was very difficult because we earned a lot from that client. I didn't want to mess up the relationship, but I couldn't be seen as a walk-over. So this was interesting; I did think about this one. I wanted to know what they'd suggest." [Z5]

"This struck me as being a really serious issue. It's a real failure of stakeholder management. And I didn't think much of this feedback at all. It just struck me as sticking a plaster over it - [summarising feedback] the resolution is that someone's going to have a chat to him and then we'll have a conference call? [said in derisory tone]. You're going to be dealing with someone who's possibly very disgruntled, a very senior member of the firm. You have to be very careful, but the feedback didn't help you, it wasn't clear enough." [Z9]

6.4 LEARNERS' RESPONSES TO THE ZENTORIA FEEDBACK EXAMPLES

Interviewees' recollections of the feedback examples generated qualitative data (in the form of transcripts) and quantitative data. Quantitative data was in the form of interviewees' numerical ratings of the perceived usefulness of each feedback example, using a Likert scale ranging from 1 to 5 where 1 = not at all useful, 2 = not useful, 3 = slightly useful, 4 = useful, and 5 = very useful).

The feedback in all three *Zentoria* activities was non-verificational: ZEN1 and ZEN2 used model answers; ZEN3 provided a subset of issues to consider. The next section discusses the finding that non-verificational feedback - particularly model answers - were treated by some interviewees as new pieces of instruction which, although interesting in their own right, were not treated as feedback. Subsequent sections discuss findings which indicated that where feedback did generate a sense of closure, interviewees were using feedback in one of three ways: to reinforce existing knowledge; to add to or tune existing mental schemata; or to collect information for potentially later use.

6.4.1 FEEDBACK AS A NEW PIECE OF INSTRUCTION

Average ratings for the three feedback examples were 3.6 (ex. 1), 3.3 (ex. 2), and 3.5 (ex. 3), which equated to ratings between 'slightly useful' and 'useful'. The positive nature of the ratings was surprising, because several interviewees had expressed dissatisfaction in principle with non-verificational feedback, and because others seemed disappointed that the feedback had not answered the questions raised in their minds by the task. For many interviewees, the implication was that feedback had failed to generate a sense of closure; against this context, feedback ratings could reasonably have been predicted to have been lower than they in fact were.

One possible reason for the positive ratings is that interviewees, having stopped typing into the Scratchpad as soon as they realised that feedback was non-verificational, began to read it as a piece of instructional text rather than as feedback to their response. As such, the feedback needed to do little more that provide information, rather than fulfil the more demanding functions of verifying and commenting on interviewees' responses to the task. Interviewees' comments -

particularly regarding model answers (ZEN1 and ZEN2) - give support to this proposition. For example, one interviewee talked about the model-answer feedback being "just like reading another page of text" [Z16]. In general, there was a sense that non-verificational feedback was read with modest interest, but without the vigour of inquiry aroused by a challenging task.

Treating the non-verificational feedback as new pieces of instruction, many interviewees' criticisms focused more on specific content than on the style of the feedback. This was particularly so with the more experienced interviewees: whilst novices were often satisfied with accepting the feedback (such as a model answer) as a statement of correct behaviour, experts were more likely to be critical of the specific content.

6.4.2 FEEDBACK AS REINFORCEMENT

Several interviewees commented on the usefulness of the reinforcement function of feedback. The term 'reinforcement' in the feedback literature carries the association of behaviourist theories of learning. However, it was evident that some interviewees were actively thinking and reasoning about the topic - a mental activity not accounted for in Skinnerian behaviourist theory.

> "It was quite useful at reinforcing ideas. It's possible that it helped to crystallise some ideas that weren't fully formed in my mind, but there was nothing that was obviously new". [Z8]

> "[feedback] was very useful for confirming your ideas, and helping you -, you know if you think of something on your own and then it gets confirmed, it helps you remember that point". [Z7]

6.4.3 FEEDBACK AS A PROMPT TO (RE)CONSTRUCT KNOWLEDGE SCHEMATA

Other comments indicated that interviewees were using the solutions and explanations in the feedback to "tune" or add to existing knowledge schemata (Rumelhart & Norman, 1978). By reflecting on the solutions and explanations, interviewees were achieving closure to the questions which the task had raised in their minds, whilst at the same time validating and modifying their current ways of thinking about the type of problem represented in the task.

> "Whilst no two experiences are exactly the same, I think there are certain sorts of experiences that people will have come across, like scope creep... And if someone can say "Well that happened on my project, and this is how I coped with it" then it gives you more strategies that you can apply". [Z13]

Reflection promoted a sense of closure for some but not all interviewees. An important differentiating factor seemed to be interviewees' tolerance of the ambiguity of the feedback. Some interviewees were tolerant of feedback which did not purport to give a complete solution which was generalisable to all business situations. These interviewees seemed satisfied with feedback which offered 'food for thought' - new ideas, perspectives and possibilities which added richness to their existing ways of thinking about the problem.

Some interviewees' comments on ZEN3 were particularly interesting. In ZEN3, the task asked learners to consider how they, as project managers, would approach a project kick-off meeting:

what questions might team members ask? and how should a project manager respond? The Scratchpad was offered to record their notes. The feedback, unlike in ZEN1 and ZEN2, was not a block of text listing action points and prescribed behaviours. Instead, it presented a graphics- and audio-rich portrayal of team members feverishly discussing among themselves their fundamental concerns, such as "who's in my team?" This feedback was not a model answer, but was more of a provocation, presenting a sideways look at the questions raised by the task, and using multimedia to do so.

Although interviewees' responses to this feedback were mixed, it clearly made an impact. Comments indicated that the impact was created not only because of the stimulating effect of the multimedia, but also because the content was somewhat unexpected and was considered a challenge to preconceived assumptions - especially to interviewees with higher levels-of-expertise.

> "I still remember it. It had an impact. ... it's interactive, it's not just reading through a page of information. ... It was quite interesting ... I went in thinking 'how shall we run the project? maybe present a project plan or whatever?' Getting feedback that was different, *it was a shock but in a positive way*. ... You think, that's another part of it which I forgot about." [Z27, italics added for emphasis]

> "It made me think 'yeah, those are things I need to think about', so I thought that was good feedback - to make you think of things beyond just the project itself and more about the people themselves too. ... I think it was complete enough because, I mean *it didn't have everything but it made you think of other areas*. If you had had a lot more stuff again it would have been too much to read through." [Z15, italics added for emphasis]

For some interviewees, what seemed to occur with ZEN3 was that the feedback had *itself* prompted a sense of inquiry by provoking cognitive dissonance, and that by stimulating reflection, the feedback had generated a satisfactory sense of closure because it was perceived to have facilitated learning. Reactions to ZEN3 suggested that the reflective, entertaining feedback had more impact than the text-based, model answers in ZEN1 and ZEN2. Although the feedback did not directly and comprehensively address the task, it made an impact by challenging interviewees to re-think the question in broader terms. The multimedia format helped to capture interviewees' attention and was well received.

For some interviewees, however, closure depended on feedback's ability not only to promote reflection, but also to bring convergence to reflective thinking processes. For example, talking about ZEN3, Z22 commented that the provocation generated by the 'fly-on-the-wall' audio clips from team members was insufficient as feedback. She went on:

> "it didn't give enough follow up ... this is almost like just a first half; there should be a second half to it. ... So that's almost like "ok, well yeah, those are good points, that's part 1, and part 2 [should be] 'oh, okay, here's an example of the kick-off meeting and the key points you should talk about'." [Z22]

6.4.4 FEEDBACK AS INFORMATION FOR LATER USE

The third use of feedback was to note it and then mentally store it as a 'takeaway' that could be referred to in the future.

> "I liked having some specific hints that you could then either store for use later, or print off or whatever, as and when you needed them." [Z1]

6.4.5 DISCUSSION OF INTERVIEWEES' RESPONSES TO NON-VERIFICATIONAL FEEDBACK

Many interviewees expressed dissatisfaction in principle with non-verificational feedback. Findings indicated that although ZEN3 provoked reflection and mindfulness in some interviewees, the model answers in ZEN1 and ZEN2 were generally received not as feedback but as new pieces of instruction. Interviewees' comments suggested that in several respects model answers were perceived as deficient as feedback for open questions.

From the perspective of this research, a different interviewing strategy was required if alternatives to model-answer feedback were to be identified. Therefore the interview schedule was supplemented with new questions, to ask interviewees in general terms what made feedback 'useful', and what they perceived as generally 'missing' from the feedback. Interviewees' responses to questions about what was useful or missing are presented in sections 6.5 and 6.6.

Responses to these questions, as well as reference to the instructional design literature, provided guidance towards developing new non-verificational feedback designs which could be used with open questions. These were presented to interviewees for evaluation as discussed in section 6.7.

6.5 LEARNERS' COMMENTS ON "WHAT MAKES FEEDBACK USEFUL?"

Interviewees were asked "what makes feedback useful?", and were directed to answer this question in terms of their generic expectations of e-learning feedback following open-questions (such as the *Zentoria* examples), or multiple-choice questions. In response, interviewees commented mainly on the instructional function of feedback - what they wanted it to 'do'. Interviewees' expectations about the function of feedback can be grouped into six categories. These are listed below using the terminology of the instructional feedback literature presented in chapter 2, enriched by interviewees' own words. Also shown is an approximate guide to the prevalence of comments about each function.

Instructional function of feedback	**Key terms used by interviewees**	**Cited by[17]**
Verify	"tell me if I'm right or wrong", "confirm"	Many
Reinforce	"re-iterate", "reinforce", "help memorise"	Many
Correct errors or state correct behaviours	"tell me",	Several
Inform	"deliver new information"	Few
Explain	"clarify", "clear up ambiguities"	Many
Promote reflection	"stimulate", "stretch"	Several

Table 15: Summary of study 1 interviewees' expectations of the instructional function of feedback

Interviewees' expectations of these functions are illustrated using quotations in table 16.

Instructional function of feedback	**Illustration of interviewees' expectations**
Verify	"...tells me whether I have done it right or wrong, as opposed to just a standard response. ... so I can judge whether I grasped it or not." [Z22] "...confirms what you in your own mind mentally have come up with". [Z6]
Reinforce	"...make me remember the material ... something which helps me store it in my memory." [Z14] "The re-iteration of the key points is important ... helps to reinforce the principles." [Z3] "[Feedback] is very useful for confirming your ideas, and helping you -, you know if you think of something on your own and then it gets confirmed, it helps you remember that point." [Z7]

[17] In this thesis, such terms have been used to give an approximate indication of the prevalence of comments, as follows: 'most' = > 50% interviewees; 'many' = 25% - 50% interviewees; 'several' = 12.5% - 25% interviewees; 'few' = < 12.5% interviewees.

Instructional function of feedback	Illustration of interviewees' expectations
Correct errors, or state correct behaviours	"...straight answers ... like 'do this in this situation', for example. In the real world of course it may not turn out that way but maybe [it'd be nice to have] a classic case like 'this is what you would do'. That'd be nice so that we don't have to figure it out on our own." [Z17] "...[something that's] supposed to be the right answer ... that I can take away." [Z21]
Inform	"...contains all the points. It's more of a checklist." [Z18]
Explain	"...help me clarify a point that was made previously". [Z26] "... if it's possible to get the "why" in there. If you're not right, are you on the right track? or…or "gee that's a common mistake, but…"." [Z20] "...cleared up any ambiguities" [Z25]
Promote reflection	"Feedback is useful it it's stimulating, if it comes across as not being a dry list of facts that purports to be authoritative, if it is something that said 'look, here are some key points to think about - there's more to this.' [The model answer] was almost like instructions - 'Repeat the message, advice the project team, advice the project director, meet the …, meet the …'. [Better to have something like] 'here are some things you've got to do, some things you might think about. In certain situations this might be appropriate'. That sort of stuff." [Z9] "...not rehash the things that are basic, but really to give a more stretching analysis." [Z19]

Table 16: Illustrations of study 1 interviewees' expectations of the instructional function of feedback

A large proportion of the comments were about verification and reinforcement, or about explanation or statement of the 'correct response' or other information to 'take away'. A small number of interviewees - usually those of higher levels-of-expertise - spoke of useful feedback being something that stretched, stimulated or in some other way promoted reflection and a deeper understanding of the topic. Mapped against figure 9, which was introduced in chapter 2, interviewees' comments can be seen to relate to five of the seven functions identified in the educational literature, although interviewees probably used the term 'reinforcement' differently from the manner defined by behaviourists because they seemed to be thinking rather than responding automatically to a stimulus. Furthermore, interviewees' discussions about example ZEN3 suggest that feedback on occasion resulted in provoking cognitive dissonance.

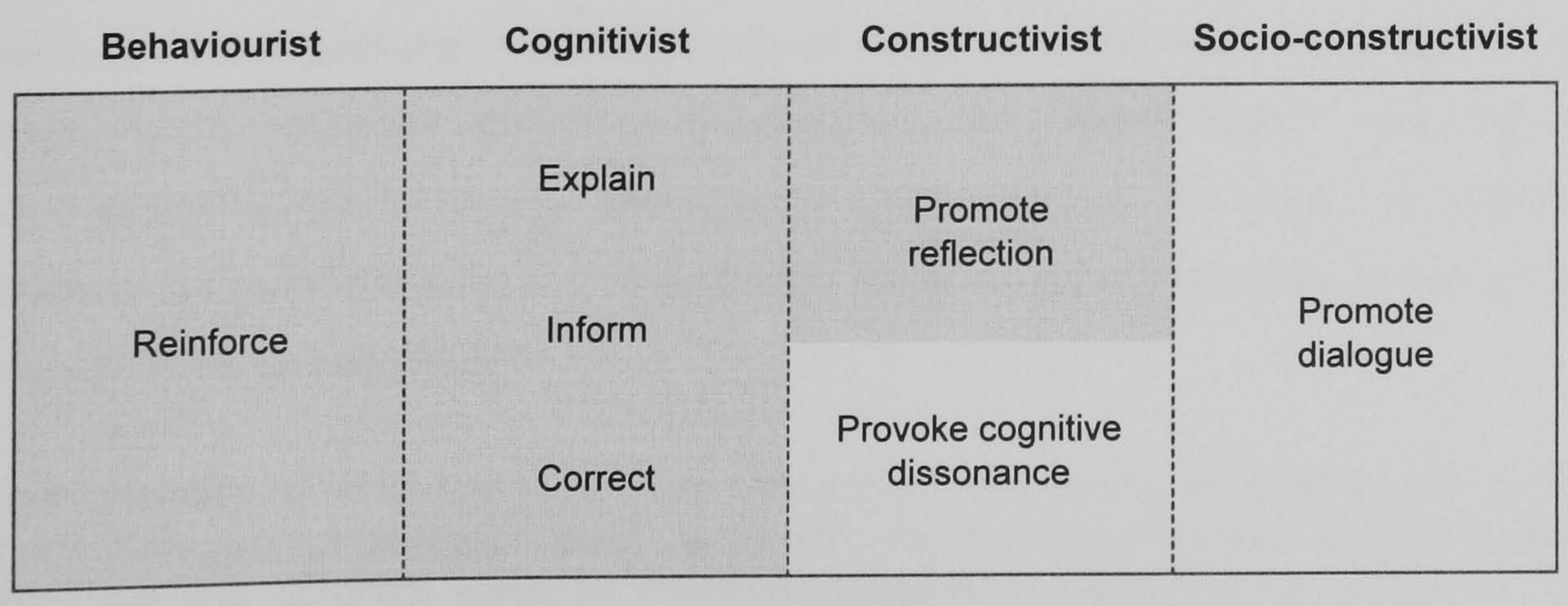


Figure 9: Instructional functions of feedback according to the principal theories of learning, shading the functions cited as 'useful' by study 1 interviewees

Interviewees' comments indicated that feedback was perceived as useful predominantly for reinforcing existing knowledge or adding chunks of new knowledge, rather than facilitating knowledge (re)construction by offering alternative insights, reflections and perspectives. In the language of behaviourist and schema theories, it was more useful for knowledge reinforcement or acquisition than for knowledge re-construction and tuning of mental schemata.

However, a different picture emerged when interviewees were later asked to identify what they felt was generally missing from feedback (section 6.6), and to evaluate nine non-verificational feedback designs which could be used with open-question tasks (section 6.7). What emerged was a desire for feedback which was more relativistic, more discursive, and more entertaining.

6.6 LEARNERS' COMMENTS ON "WHAT'S MISSING FROM FEEDBACK?"

To gain a different perspective on interviewees' expectations of feedback, they were asked to identify what they felt was 'missing'. The question was asked in two ways. Firstly, if interviewees were particularly critical of a specific feedback example, they were asked "what's missing, and what would you prefer to have?" Secondly, given the frequent reference made to classroom training as an alternative to e-learning, interviewees were asked "what's missing from the feedback which human tutors or class participants might have given?"

6.6.1 RECOMMENDATIONS RELATING TO SPECIFIC FEEDBACK EXAMPLES

The aim of the first question was to investigate interviewees' criticisms of specific feedback examples, and to identify their recommendations for improvements. Interviewees' comments about what was missing - and what they *wanted* from feedback - can be grouped into four categories:

- What-if scenarios
- "Take-aways"
- Behaviours to avoid
- Multi-function feedback

What-if scenarios: Several interviewees, especially the most experienced, felt that the *Zentoria* model answers were too simplistic, and ignored the potential for variability in: the environment; the problem; or in the personal circumstances of those involved with the problem. For these interviewees, model answers presented a solution which, albeit logical, was only valid in a sterile world devoid of complications and human idiosyncrasies. Several interviewees wanted the feedback to be more realistic and to embrace "what-ifs" [Z11], thereby allowing for different solutions under different conditions.

> "[What's missing is] what happens when the project director is very hands-off, or what happens if the project director doesn't agree with you and you still need to do something, or what are the different ways to improve stakeholder management process... [The feedback] gives you the action plan, but the different things that could come up, or the different ways to react to things, aren't really addressed." [Z16]

Take-aways: Some interviewees expressed a wish for take-aways and "downloadable" [Z13] feedback. They wanted feedback to provide information such as templates and checklists, which distilled the essence of the feedback message, but which were formatted for easy download and later use. Some interviewees implied that these 'take-aways' would be stored *in case* they might be useful at a later point, but would not necessarily promote immediate learning.

Behaviours to avoid: Some interviewees wanted feedback not only to state the 'correct' behaviour - what *should* be done - but also what should *not* be done. Learning from one's mistakes was recognised as an important, but painful process. These interviewees wanted feedback to forewarn them of common mistakes and how to avoid them.

Multi-function feedback: Many interviewees commented that feedback would be of more value if it fulfilled multiple functions: for example, a model answer could give generic, prescriptive guidelines, together with an example showing how the model answer might be applied in practice. These comments mirror those of others who said that what they missed from the classroom was the tutor's ability to blend theory with practice.

6.6.2 COMPUTER VERSUS TUTOR AND PEER FEEDBACK

Interviewees' comments about what a human tutor or class participants would add can be grouped into four categories:

- Sense of realism
- Translation of theory into practice
- Alternative perspectives
- Opportunity for debate

Sense of realism: Some interviewees compared the "tangible examples" [Z19] and the "actual experiences" [Z2] given in class, with the "staged" [Z19] scenarios depicted in *Zentoria*. There was a sense that e-learning feedback was often "artificial" [Z8] and neglected "real-world issues" [Z28].

Translation of theory into practice: Some interviewees felt that a human tutor would have better combined the theoretical world of 'key learning points' and model answers with practical examples of how to apply them to real problems. E-learning feedback was perceived as considerably less effective in demonstrating the application of theory in practice.

> "It's easy [for the feedback] to say, "meet the client, go over what the scope is and make sure they understand", but quite often you have [the client saying] "well you know it's really important to us, can't we just squeeze it in" - those kind of discussions. And it's more of an issue of - how do I handle the different ways that that conversation can go? That's what you get from the real-life interaction with a tutor." [Z16]

Alternative perspectives: Some interviewees were concerned that the *Zentoria* feedback presented a single perspective on problems, to the exclusion of alternative, equally-legitimate perspectives. The assumptions which frame any attempt at problem-solving were hidden in the feedback - assumptions such as the nature of the goal, the time-frame for intervention, and

other process and contextual factors. By ignoring these contextual factors, some interviewees perceived the feedback as representing an inappropriately dualistic position - specifying a universally-correct behaviour for problems which they felt required a more relativistic problem-solving approach.

> "What you've got to bear in mind [is that] in these situations a lot of people do things differently, so you don't want to constrain the way people do things, or encourage people to do things in a certain way. There are many ways to skin a cat." [Z10]

Opportunity for debate: Several interviewees stated that class-based training provided an environment which encouraged debate between participants with different experiences. They felt that debate and discussion facilitated more meaningful learning than e-learning training could ever do.

> "As you go into more advanced project management techniques and theories and whatever else, then you have loads of questions as you go on, and you need to interact with a human to actually ask the questions and get a response." [Z11]

> "[I miss] the interaction with other people - the debate. One of the dangers with CBT is that you miss that. A lot of the thinking comes from discussing it within a group, and also when you break up at the different coffee breaks and you talk about what you've learned." [Z29]

Class discussions were seen as generating richer insights and perspectives - more 'food for thought' which interviewees could use to elaborate their mental schemata. A skilled tutor was seen as someone who could draw out parallels between experiences to help class participants conceptualise issues at a more abstract level, as an aid to generalisation.

The possibility of e-learning feedback fulfilling a socio-constructivist function of *dialogue* (Askew & Lodge, 2000) seems contradictory to the essence of *self-paced* e-learning. Nevertheless, with developments in technology, opportunities for dialogue with the 'outside world' do exist, and their suitability was discussed with interviewees in follow-up questions. Specifically, some interviewees were asked about the utility of a query-point contactable by email, and of online, asynchronous discussion forums (akin to the ones provided by the organisation through Lotus Notes software). Responses to the email query-point were positive; however, its utility was perceived as limited unless the response was immediate. The idea of online discussion forums was well received, but again, the lack of immediate response or resolution was thought likely to limit their utility.

> "It's obviously feasible. Personally I wouldn't use it. I'd be looking for immediate feedback for the example. That's what I like about tutor-based courses - you're in the classroom and people immediately give their feedback, and that then sticks because it's all in context. If I'd done the CBT and come out, and then looked up something on a Lotus Notes database ... I'm not sure it would stick." [Z9]

It seems that a significant difference between feedback in a class-room, and e-learning feedback using email or forums, is the immediacy of query-resolution. In e-learning applications, learners may be less likely to achieve closure unless queries generated by the task and feedback can be effectively answered by the application itself.

6.6.3 DISCUSSION OF INTERVIEWEES' COMMENTS ON WHAT IS 'USEFUL' OR 'MISSING' FROM E-LEARNING FEEDBACK

The preceding sections presented an analysis of interviewees' comments about what they perceived as 'useful' or 'missing' from e-learning feedback. Interviewees were also asked to compare e-learning feedback with the feedback they received in class-based environments. It was not surprising that they wanted e-learning feedback to replicate and improve upon the best aspects of class-based feedback.

Two key expectations emerged from this analysis which at first sight seem contradictory: firstly, the expectation for more discursive and relativistic feedback; and secondly, the expectation for more prescriptive feedback.

The expectation for more discursive and relativistic feedback was indicated by comments recommending a move away from a theoretically "model" answer, towards feedback which exemplified the different ways of applying theory to practice. Interviewees' comments also implied that if feedback was perceived as reflecting ivory-tower ideals as opposed to grounded reality, it might be dismissed as of limited practical value. In addition, the desire for alternative perspectives and what-ifs suggested an expectation for less dualistic, causal-explanatory feedback, and for more feedback which offered complex-derivational explanations or which promoted reflection on the many issues and perspectives surrounding a given problem. The desire for debate indicated an expectation for a more discursive, collaborative approach to learning which is an important theme in socio-constructivist pedagogies.

By comparison, the second expectation - for more prescriptive and dualistic feedback - seemed somewhat of a paradox. However, it is logical when considered from the perspective of personal risk. Interviewees seemed especially keen to be told what behaviours to avoid if the task generated a high assessment of personal risk ('APR'). In general, novices seemed more likely than experts to have a high APR for any given problem, but this was not always the case: experts were sometimes more cognisant of the legal and compliance issues surrounding business problems, and as a result experienced a high APR.

6.7 LEARNERS' EVALUATION OF NON-VERIFICATIONAL FEEDBACK DESIGNS

As discussed previously, it quickly became apparent during early interviews that, in principle, model-answer feedback was perceived to have limited value. From a research perspective, what was required was a better understanding of alternative ways of presenting non-verificational feedback for open-question activities, since the possibility of meaningful assessment by computer did not seem imminently feasible given limitations in natural language processing. Based on comments from interviewees Z1 and Z2, supplemented by a reading of the literature on instructional design, six non-verificational feedback designs were identified as alternatives for open-question activities. The six designs were presented to interviewees Z2 to Z11. Based on comments from these interviewees, two further designs were identified, and added to the original six designs when presented to the remainder of the interviewees. For

comparative purposes, the model-answer option was also included, making a total of nine designs. These designs are described in table 17.

Set	Short-hand name	Description given to interviewees
Set 1	MA	Model answer
	KD&D	Key do's and don'ts
	Exmples	Several real-life examples, each describing a project situation, the intervention, and the outcome
Set 2	BP	Description of the formal, best practice intervention
	Issues	Explanation of the underlying issues behind the problem
	Exp. thnk proc	Description of how an expert would think through the problem
Set 3	Consequences	Video showing the consequences of several problem interventions
	Exp. p&c	Video showing an expert comparing the pros and cons of several problem interventions
	Peer debate	Video showing peers in an informal setting debating the merits of several problem interventions

Table 17: Nine non-verificational feedback designs evaluated by study 1 interviewees

The feedback designs were introduced to interviewees towards the end of each interview. Interviewees were told they would be given a description of nine non-verificational feedback designs, and asked to comment on their usefulness as feedback to the type of open questions represented in the *Zentoria* examples. To simplify this comparative task, designs were grouped into three sets with three designs in each set[18].

To analyse interviewees' responses, their comments were transformed into a rating scale of -2 to +2, according to whether comments were positive or negative, and the strength of those comments. Where no comments were made, a zero rating was recorded. The average ratings from the total sample are ranked in figure 10. For comparative purposes, figure 11 presents four charts showing the average ratings for interviewees of grades 2, 3, 4 and 5, but retaining the same ranking sequence as that of figure 10 for the total sample. Figure 12 then ranks the ratings for each interviewee group.

[18] Sets 2 and 3 were introduced from interview Z2; set 1 was additionally introduced from interview Z12. The designs were not presented to two interviewees because of time constraints which impinged on the final part of those interviews. This exercise therefore involved 26 interviewees from the total sample of 29.

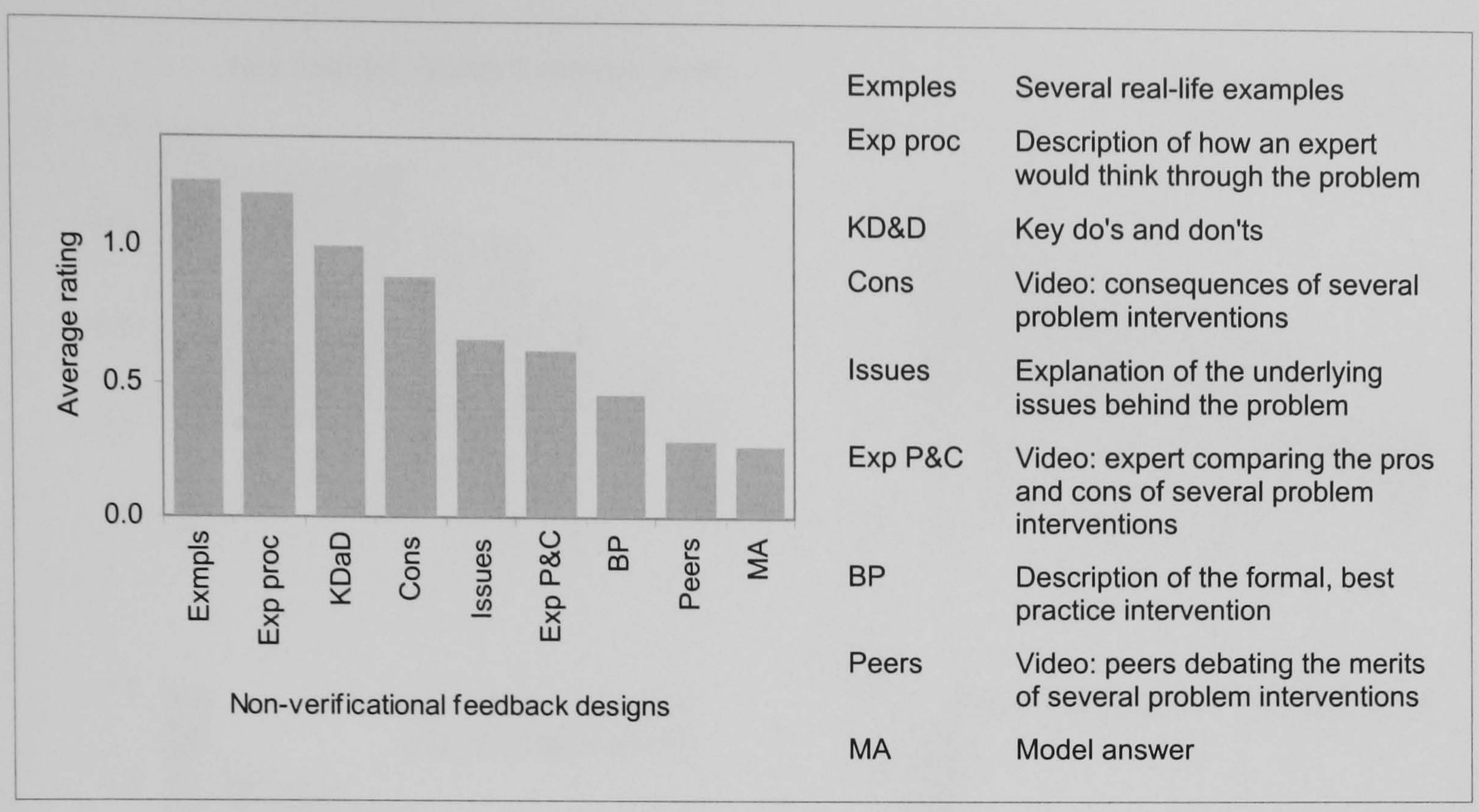


Figure 10: Averaged and ranked interviewee ratings for non-verificational feedback designs, for the total sample in study 1 (n=26)

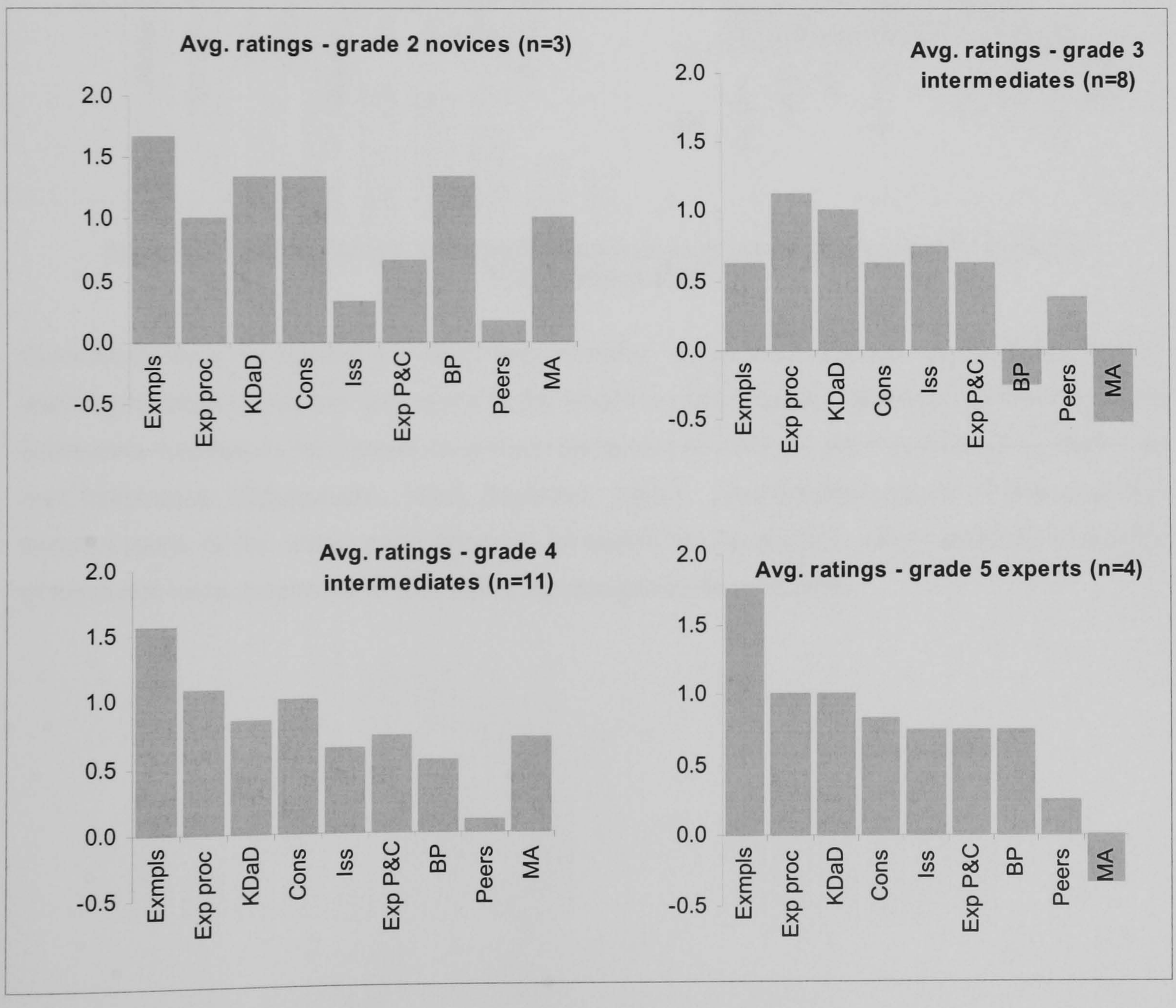


Figure 11: Averaged interviewee ratings for non-verificational feedback designs, using ranking sequences derived from the total sample for comparative purposes, by interviewee grade

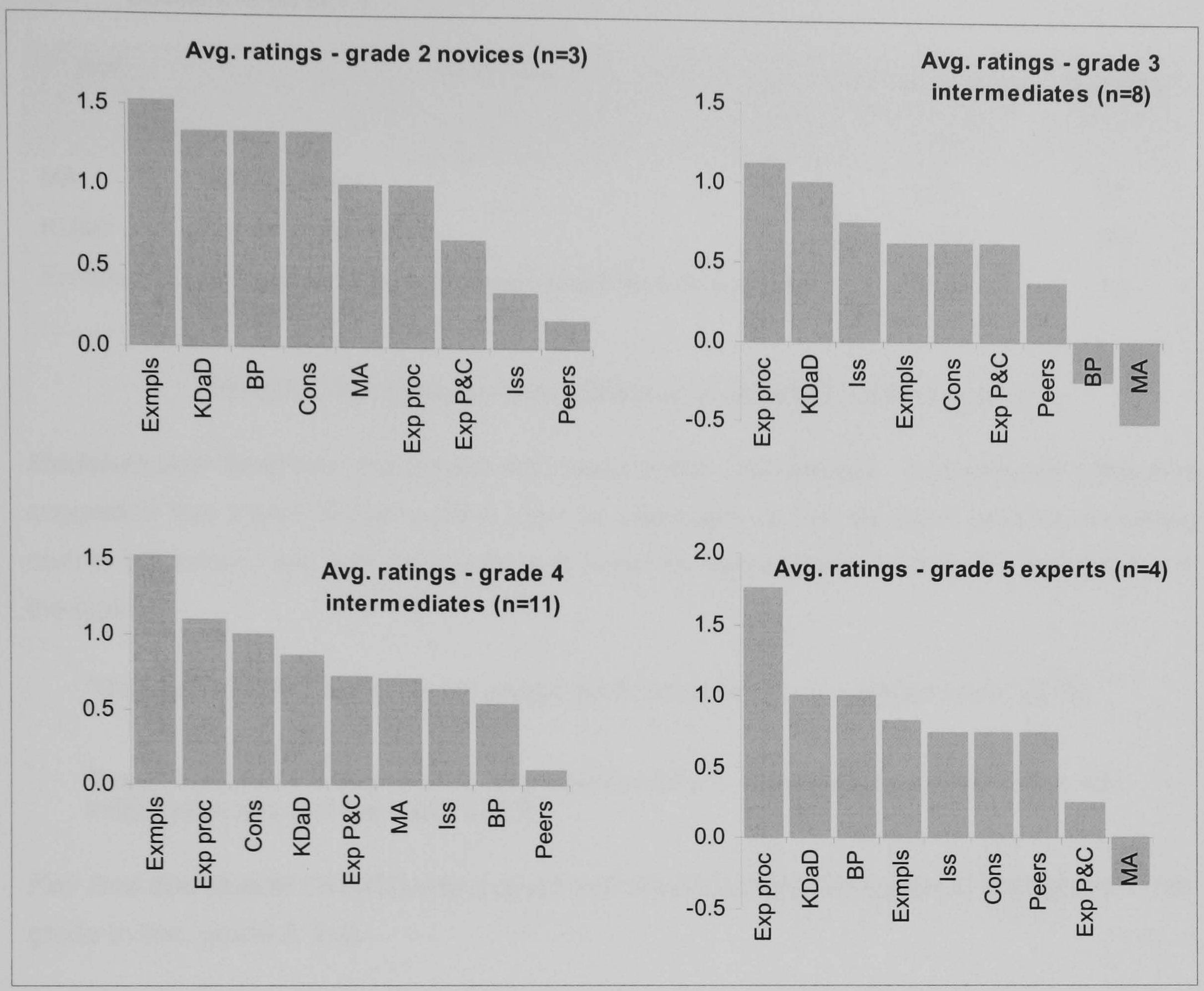


Figure 12: Averaged and ranked interviewee ratings for non-verificational feedback designs, by interviewee grade

Comments were interesting for what they revealed about interviewees' expectations from e-learning feedback, and are discussed in the sections which follow. However, at this stage, the comments needed to be treated cautiously because opinions do not necessarily translate into real behaviours (Oppenheim, 1992; Sapsford, 1999). The iterative nature of this research allowed some of the stated preferences to be tested during study 4, where concrete examples of feedback were presented to a different sample group for evaluation.

6.7.1 COMMENTS ON SET 1

Ref.	Description	Average rating (total sample n=26)	Ranking (of 9)
MA	Model answer	0.26	9th
KD&D	Key do's and don'ts	1.00	3rd
Exmpls	Description of how an expert would think through the problem	1.24	1st

Table 18: Description, average ratings and overall ranking of items in set 1

Model-answer feedback was ranked the lowest of the nine designs. Interviewees' comments suggested that model answers were seen as equivalent to the feedback function of 'stating correct behaviour', and was sometimes perceived as inappropriate for the complex realities of the topic.

> "Getting the perfect answer is not always great, because it's not a perfect world." [Z16]

> "I don't think there is such a thing as a model answer ... because it really depends on the individual project and the client." [Z23]

Key Dos and Don'ts ('KD&D') was popular with most interviewees (grade 5: 2nd; grade 4: 5th; grade 3: 2nd; grade 2: 1st).

> "The key dos and don'ts would be very good because then you *know* what is wrong, and those types of things stay with you." [Z23, emphasis in original speech]

An advantage of KD&D over model-answer was possibly that KD&D not only stated correct behaviour, but also explicitly warned of behaviours to avoid.

'Real-life' examples had the highest overall ranking of the nine designs.

> "[The others] sounded too textbook-like or academic. I'd prefer real-life examples." [Z22]

However, some interviewees tempered their positive comments with qualifying remarks:

> "With the real-life examples, they're kind of a fairy tale and it's oftentimes hard to give enough background information or paint a picture well enough to present a complex issue in the time available ... it might drag on too long." [Z26]

> "There's always a risk with the examples - [because with] everyone's experience being different - how can everybody relate to them? there's just a risk...otherwise it would be nice, but -." [Z27]

Comments from one interviewee (grade 3) indicated that she expected real-life examples to provide her with a set of blue-prints to guide her future problem-solving behaviour.

> "... as long as you're provided with enough examples and you can make one fit to what your issue is." [Z21]

For this interviewee, the function of 'examples' feedback seemed to be akin to that of stating correct behaviour. For other interviewees with a less dualistic orientation, one of the following three possible reasons might explain the high rating:

- The first is that examples were received as 'cases', for use in what Riesbeck & Schank (1989) called "case-based reasoning" to reason about analogous problems in the real-world.
- The second possibility is that examples supported what Bandura (1986) called social learning, except that in this case, learning would be vicarious rather than direct. By hearing 'war stories' from the field, and by finding out how problem interventions 'turned out', learners could vicariously experience success or failure in the risk-free environment of e-learning. Through vicarious experience, lessons could be drawn about behaviours to imitate or avoid.
- The third possibility is that by reflecting on the examples, learners were encouraged to conceptualise key issues and their relationships thereby improving learners' schemata for the given problem-type.

6.7.2 COMMENTS ON SET 2

Ref.	Description	Average rating (total sample n=26)	Ranking (of 9)
BP	Description of the formal, best practice intervention	0.46	7th
Issues	Explanation of the underlying issues behind the problem	0.65	5th
Exp proc	Several real-life examples, each describing a project situation, the intervention, and the outcome	1.19	2nd

Table 19: Description, average ratings and overall ranking of items in set 2

Best practice ('BP') scored a low average rating, for reasons similar to those given for the model answer. For some interviewees, however, BP feedback was welcomed precisely because it established the organisation's 'line' against which actual practice could be benchmarked.

Issues underlying the given problem, provided by an expert, was ranked 5th overall, but for grade 2 interviewees it was ranked last. For some interviewees, including novices, this feedback style was dismissed because issues were perceived as being too dependent on the circumstances of the specific problem. Interviewees with higher levels-of-expertise were more accommodating, and saw issue-based feedback as a useful prompt for reflection.

> "... this one [issues] would make me understand what the underlying issues are and therefore I could make my own judgement. ... It's the *why*, as opposed to "just do it this way because we've done it for the last ten years". [Z22]

It is possible that interviewees who were positive about 'issues' feedback recognised that issues tend to be repeated across multiple problems, and that through experience, one becomes

sensitised to identifying them. Issues therefore become a way of indexing experiences of problems and their solutions, and of recalling them when analogous problems arise.

An **'expert's process of thinking through the problem'** was ranked highly by most interviewee groups (grade 5: 1st, grade 4: 2nd, grade 3: 1st, grade 2: 6th). This result is not surprising if one considers that an emphasis on process and on reasoning skills is embedded in the ethos of many management consultancy firms. Many firms subscribe to what Schein (1987) referred to as "process consulting": they apply standard methodologies to evaluate the effectiveness of processes in client operations, and generally provide solutions which impact at the level of those client processes. Findings indicated that experts were admired because they were credited with understanding these processes.

> "An expert is someone who has experience on how to actually approach it." [Z23]

The grade 2 interviewees, perhaps because they had not yet adopted a processual approach to problems, ranked the 'expert - thinking process' feedback only 6th, after the more outcome-oriented feedback styles of model answer, best practice, and key dos and don'ts.

6.7.3 COMMENTS ON SET 3

Ref.	Description	Average rating (total sample n=26)	Ranking (of 9)
Cons	Video showing the consequences of several possible interventions	0.88	4th
Exp P&C	Video showing an expert comparing the pros and cons of several possible interventions	0.62	6th
Peers	Video showing peers in an informal setting debating the merits of several possible interventions	0.29	8th

Table 20: Description, average ratings and overall ranking of items in set 3

Consequences feedback was highly valued by the more experienced interviewees (grade 5: 3rd, grade 4: 3rd) and modestly valued by the less experienced (grade 3: 5th, grade 2: 4th). This type of feedback seemed to fulfil two main functions. The first was to promote social learning (Bandura, 1986) through vicarious experience.

> "You'd see the reactions. [You'd see] what kind of reactions you would want to see in the future and which ones you wouldn't. Which type of reactions you'd want to see if you were placed in that type of situation. ... you would learn your lessons without having to experience it." [Z21]

> "Most people know really what they should be doing, and what [the feedback is] actually doing -- you should be appealing to the emotions, and you're saying that this bad situation could be arising, and this could be you in the hot seat here, rather than saying some sort of technical, factual thing that I'd forget about." [Z8]

The second function was to motivate learners to continue to engage with the e-learning.

> "The consequences one has probably the most appeal, or it's likely to get the most attention." [Z16]

There was also recognition that unless well done, consequence feedback could be "cheesy" [Z7], or "something to laugh about" [Z15]. Several interviewees suggested that the value of consequence feedback would be enhanced if supplemented by comments from an expert.

> "It would be really great to see it first and then go back and have an expert comment on it. ... [The combination of the two] reminds me of how DVD movies these days have the director's cut and their comments, after the actual scene. It's just really interesting. You'd get a lot more out of it than by just watching [the consequences]" [Z17]

> "I think [consequences feedback] would really suit the scenarios where you learn by trial-and-error ... Maybe if you chose the wrong path, then you can have the expert at the end saying what was good and what was bad - evaluating your decision." [Z18]

'Experts discussing pros and cons' was ranked low (grade 5: 7th, grade 4: 8th, grade 3: 6th, grade 2: 7th). This was surprising if compared with the other 'expert' feedback, which related to the process of solving problems. This discrepancy was possibly because although experts were credited with using effective *processes* for thinking through problems, the culmination of their thinking process - the *solution* - was not credited with being necessarily correct.

> "You just have to watch the news to get 10 different experts saying 10 different things. So that would be the most dangerous one. ... It's very rarely that you get one right answer, and to have an expert come out and spout that this is the right answer - I think [it] could be misleading". [Z2]

Comments about **peer debate** were interesting for what they revealed about an apparent 'love-hate' relationship with the status of the expert. Several interviewees saw experts as being somewhat removed from reality, and of pronouncing idealistic but not necessarily pragmatic solutions.

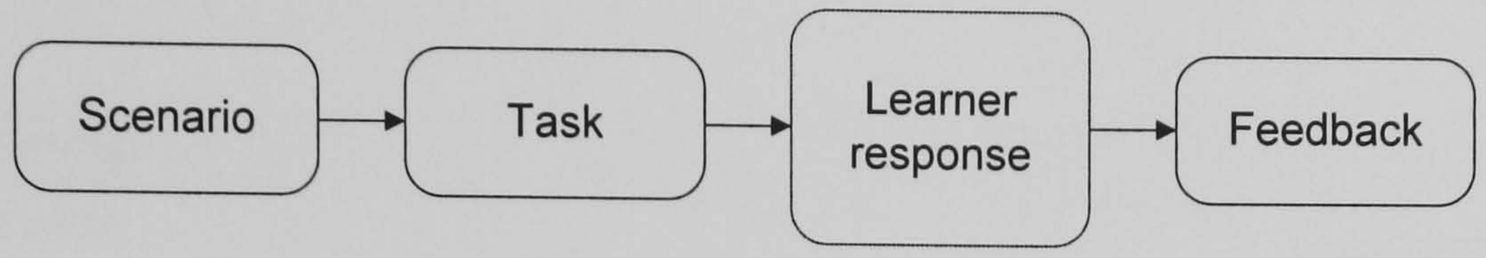
> "You talk to people who are at your same level, your peers, and get their views, because they're in the trenches, whereas the expert is the theoretical, and they are the actual. So a combination of - here's what the experts would advise, and here's what your peers would be doing - that would be good." [Z19]

For some interviewees, peer debate was perceived as useful because peers would advocate new ideas and perspectives which could be reflected on. Most interviewees, however, commented that peer-debate feedback was likely to create confusion.

> "I guess [it'd be OK] if it's a controlled or even scripted type of debate to be sure to get the appropriate points across, but without a clear resolution - I think a debate often doesn't really tell you anything in the end...it gets different people's opinions but if the opinions are conflicting then it doesn't really let you know what's right or what's wrong or what's better." [Z16]

6.8 DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

In chapter 1, the context of this research was described in terms of scenario, task, learner's response and feedback.



Findings from study 1 indicated that interviewees' expectations of, and responses to feedback were far more complex than indicated in this simple framework, and that an understanding of the function of feedback requires an appreciation of the wider context in which feedback is received. In particular, it is argued that an interpretation of learners' experiences of feedback is likely to be misleading if studied in isolation from their experiences of the immediately-completed task.

The importance of the task itself in framing interviewees' expectations was discussed in section 6.3, where it was argued that for the learners interviewed, the task was important in generating a sense of inquiry: a task perceived as challenging and relevant to the workplace generated questions in the mind of the interviewee which sought closure from the subsequent feedback. It was also argued that interviewees' assessment of the personal implications of an equivalent scenario going wrong in a real-life business setting influenced their 'assessment of personal risk' ('APR'), and their expectation of the instructional function of feedback. Findings indicated that these two factors - sense of inquiry and APR - influenced interviewees' specific expectations of feedback.

Interviewees were asked to indicate their generic expectations of what constitutes good feedback by identifying what made feedback useful, and what was generally missing from feedback. To validate their responses in the context of non-verificational feedback, they were also asked to compare nine non-verificational feedback designs.

These investigations indicated that before completing a task, learners develop specific expectations for feedback which are a composite of their generic expectations for feedback, their sense of inquiry, and their APR. The findings also indicated that from the learners' perspective, the most important function of feedback is to enable them to achieve a sense of closure to the questions raised in their mind by the task, and in a way which matches their expectations. If expectations are not satisfied, learners experience a sense of non-closure which manifests itself in several ways. Furthermore, learners' outcomes (i.e. their sense of closure or non-closure) prompt them to revise their anticipation of the value of feedback, which in turn influences their engagement and sense of inquiry in future tasks.

From these findings, a prototype conceptual framework was developed which is presented in figure 13. The framework represents learners' expectations of, and responses to e-learning feedback. The framework also acknowledges the influence of contextual factors at an individual

and environment level, such as individual differences between learners, and the position of the e-learning application within the organisation's training curriculum. These contextual influences were not directly studied as part of this research, with the exception of learners' level-of-expertise, and to a limited extent their business unit within the organisation. The conceptual framework was further developed in studies 2 and 3.

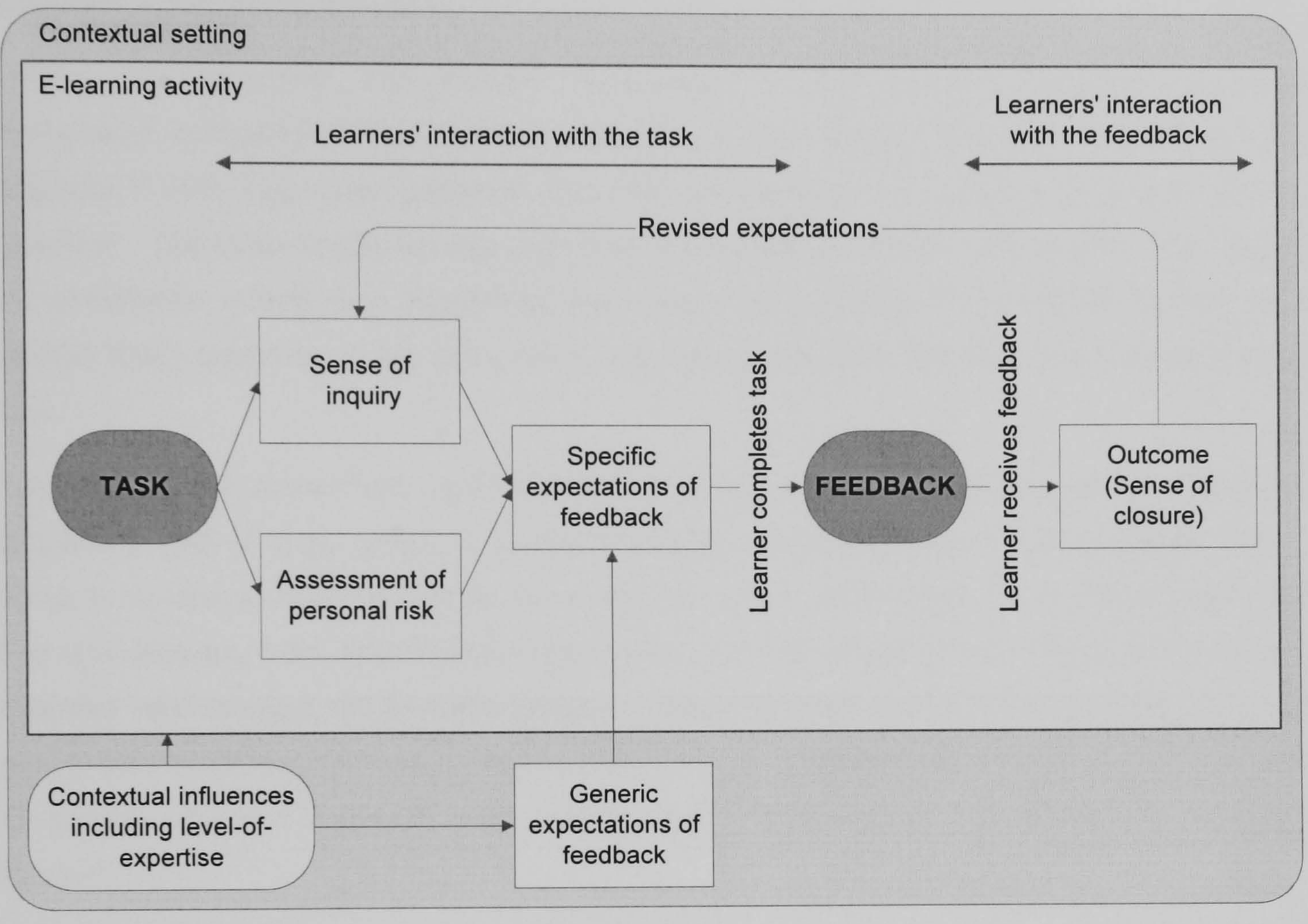


Figure 13: Prototype conceptual framework representing learners' expectations of, and responses to e-learning feedback, developed following initial analysis of study 1

6.9 CONCLUDING REMARKS

This chapter discussed interviewees' sense of inquiry, assessment of personal risk, expectations of feedback, and sense of closure or non-closure on receiving the non-verificational feedback from Zentoria. The relationship between these aspects of interviewees' experience were investigated and then presented in a conceptual framework, which was introduced in the previous section.

Section 6.4 discussed interviewees' responses to the *Zentoria* feedback examples. Interviewees' comments indicated that on receiving model-answer feedback, they initially either compared it with their own response and prior knowledge, or treated it as a new piece of instruction. The latter response was prompted if learners committed little time or effort towards task completion, which was sometimes the case if they predicted that feedback from open-question tasks would be in the style of non-verificational model answers and therefore of little value.

Where a sense of closure had been achieved, interviewees' comments indicated that they used feedback in one of three ways: to reinforce existing knowledge; to prompt reflection thereby adding to or tuning existing mental schemata; or collect information for potentially later use. What was missing from interviewees' comments was any expectation of feedback's ability to challenge and change deeply-held beliefs. Open-question tasks were criticised by many interviewees because they expected feedback to be verificational. Because of this, many interviewees did not engaged with model-answer feedback at a level which resulted in reflection.

Compared with their recollections of feedback in previously-completed e-learning applications, interviewees' opinions about *ideal* feedback indicated that they wanted feedback to support a wider range of learning processes: for example, learning what to 'avoid' and not just what to 'do'; learning about process and not just action; and learning through vicarious experience and not just from theory. Whilst the importance of these aspects are recognised in the educational literature, there are few signs that these principles are regularly and effectively applied to the design of e-learning feedback.

Findings from study 1 suggested that an important deficiency of non-verificational feedback is that it is not tailored to the learners' response to the task, and therefore is limited in the extent to which it can generate a sense of closure. In order to explore the role of verificational feedback, two additional studies were undertaken to investigate learners' responses to activities combining multiple-choice questions and verificational feedback. These studies are discussed in the next chapter.

CHAPTER SEVEN
ANALYSIS OF STUDIES 2 & 3

7.1 INTRODUCTION

In the previous chapter, findings from study 1 were discussed, and a prototype conceptual framework was developed to represent learners' expectations of, and responses to feedback. In this chapter, the findings from two further studies are discussed and the conceptual model is reviewed and further developed in sections 7.2 to 7.5. Section 7.6 consolidates these findings by representing the full conceptual framework, and section 7.7 presents the interactions between the main components. Finally, section 7.8 draws on the preceding analysis to propose five hypotheses relating to learners' responses to variations in the attributes of feedback. These were tested in study 4, which is discussed in chapter 8.

The two studies presented in this chapter were conducted in parallel and specifically explored learners' experiences of activities combining multiple-choice questions and verificational feedback, thereby building on the findings from study 1. Study 2 used *Coaching Advantage*, an e-learning application which was web-based, while study 3 used *Navigating the Grey* which was delivered using CD-ROM. The sampling frame and e-learning applications were described in chapter 5.

7.2 INFLUENCE OF TASK ON LEARNERS' OUTCOMES (SENSE OF CLOSURE)

In chapter 6, it was argued that the task itself stimulated learners' sense of inquiry and assessment of personal risk ('APR'). Sense of inquiry was aroused by a task which was perceived as relevant to the work setting, and which was evaluated as challenging yet achievable. APR reflected learners' assessment of their capability to deal with the problem represented in the task, and the implications of failure in a business setting. A strong sense of inquiry and a high APR prompted questions in the mind of learners arising from the task, and influenced their specific expectations of feedback. Where the task failed to promote a strong sense of inquiry and APR, learners' expectations of the feedback and of its likely value were low. In either case, closure could only be achieved if the expectations were satisfied by the resulting feedback.

In studies 2 and 3, sense of inquiry was explored further in order to identify any additional factors which influenced learners' expectations from feedback. Findings were supportive of those in study 1, and reinforced the importance of sense of inquiry, and the importance of relevance to the workplace environment and a sense of challenge. In addition, a further factor was identified: that of a sense of participation. Each of these three components to a sense of inquiry are discussed below; however, to avoid duplicating the detail of chapter 6, relevance and challenge are discussed only briefly.

7.2.1 RELEVANCE

Findings indicated that where the task and scenario were perceived as irrelevant to their workplace setting, interviewees' expectations of the value of the feedback were low. For example, several interviewees from the operational research & support units commented that the activities in *Navigating the Grey* were not relevant to their day-to-day working environment.

> " ...a lot of the examples, they were aimed at consultants. But if you're [in OR&S], you don't really encounter them. You do a lot of client-related work and stuff, but the examples [in *Navigating the Grey*] were really for someone who is heavily engaged in client relationships, who have higher responsibilities. ... relevance-wise, relevance to the work I'm doing right now, I didn't really see any relevance there." [N10]

Many of the interviewees who mentioned lack of relevance of the task indicated that this influenced their downgrading of the expected value of the feedback, and their tendency to dismiss it as irrelevant. Only one interviewee gave a contra opinion.

> "Just because I may be unable to relate to a specific example, it doesn't mean I can't learn from it. That way if something like that ever comes up, or is even remotely adjacent to a scenario like that, I'd know how to handle it, what steps I should take." [N12]

Where relevance was perceived as high, interviewees seemed to be more engaged with the task, and had higher expectations of the feedback. Interview N9 compared the (low) relevance of two of the activities from *Navigating the Grey* with another activity[19] from the same application, which he found more interesting.

> " ...it may be to do with the topic. The computer software scenario was more interesting to me personally. That was a dilemma that I was really interested in - knowing how to solve that. I've done some small-network projects, so I was interested to find out how he would approach that situation. ... if you have a situation that doesn't relate as well, you tend to - not to retain as much I would say." [N9]

Some of the interviewees who had taken *Coaching Advantage* commented on a perceived lack of relevance. This may have been due to the fact that whilst *Navigating the Grey* was rolled out in a blanket implementation to all employees of the organisation, *Coaching Advantage* was delivered only to practising or newly-qualified coaches.

7.2.2 CHALLENGE

Perceived lack of challenge was indicated in comments of some novices and intermediates, who complained that the response options for some of the multiple-choice questions were so similar that discrimination between them was difficult. There seemed to be a fine line between perceived challenge, and a perception that the task was *not* challenging because it lacked clarity and was therefore beyond the capability of *any* learner. Findings indicated that differences in responses were influenced by interviewees' level-of-expertise. For example, none of the experts expressed concern about lack of task clarity, suggesting that experts were better able to discriminate between the available response options and appreciate the

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[19] The activity referred to was not one of the three examples represented in the screenprints.

importance of apparently minor differences which could result in materially-different consequences. Only one interviewee, an intermediate, was positive about the inherent challenge of having to chose between apparently-similar response options "because it made me think" [C14].

7.2.3 SENSE OF PARTICIPATION

Interviewees described one additional factor relating to sense of inquiry, which was the experience of being drawn into the activity and as such becoming an active participant in the task. This sense of participation was at two levels: intellectual and empathic.

Intellectual participation

Findings indicated that interviewees felt intellectually involved if activities give them a sense of participation in the activities at a mental level. Participatory activities created a sense that learners' interaction with the task was relevant to how the activity unfolded. Several interviewees praised activities such as NtG2[20] and CA2 - which contained multiple steps or decision points - because these activities generated a satisfactory sense of involvement and participation, allowing them to see the consequences of incorrect decisions before giving them another opportunity to resolve the problem using a different solution.

> "I liked it [NtG2] because it showed you, OK, if you picked this answer - then it shows you why it wasn't a good decision, and ... then it says 'try another answer'. And if you try another answer, it gives you more feedback if it's not a correct choice. So I liked it. ... it more or less says 'this was not a wise decision on Randy's part, and let us let *you* see what the consequences of that decision will be'. And it goes into another scenario and really lets *you* see how making that one decision affected the outcome in the future." [N4]

However, not all interviewees felt a satisfactory sense of participation when completing activities CA2 and NtG2. Some, especially the novices, became confused if activities took them down 'error paths' without first explicating the key learning points, because they were not able to infer the learning points for themselves.

> "I think [with NtG2] it would help if it told you what you *should* have picked, and then they could continue on the same 'keep watching' thing, as long as before they did that they said 'actually you should have picked this one, but based on your decision, we're going to go this way'." [N8]

The participatory aspect of intellectual inquiry resembles what Moore (1989) called "learner-to-content interaction", and what Holmberg (1986, cited in Hawkridge & Edirisingha, 2002) called an "internal didactic conversation". In an internal conversation - between the learner, the e-learning content, and the learner's knowledge and experience - the learner moves between one and the other, making sense of the new inputs against the context of existing knowledge schemata. For some learners interviewed for this research, however, the linear design of the e-

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[20] NtG1, NtG2 and NtG3 denote activities in *Navigating the Grey*; CA1, CA2 and CA3 denote activities in *Coaching Advantage*.

learning application and the poor navigational structure created a level of frustration which hindered any sense of participation in the activities.

Empathic participation

Empathic inquiry was aroused by interviewees' *emotional* response to the activity. Findings indicated that emotional responses were aroused by activities which were realistic and relevant to interviewees' workplace experiences, and which therefore aroused feelings of self-projection, vicarious curiosity, empathy and sympathy. Activities using scenarios which depicted realistic portrayals of human interaction - particularly those delivered using video - seemed to draw interviewees into an unfolding sense of theatre which absorbed their attention. Many learners who commented on these activities used the term 'interactive' to denote the interactivity *between* characters represented in the scenario, and their own sense of involvement *with* those characters.

> "I think it was good because it was interactive. You felt like you were experiencing it and you were getting yourself in the same scenario. ... For me it's kind of - I get distracted ...the videos helped [avoid that] because at least there was some interaction going on, but when there's a lot of reading and stuff it gets a little too much." [C15]

Scenarios perceived as relevant or realistic and which used video in their portrayal of a situation were particularly successful in arousing emotional responses. One interviewee [C17] spoke of the experience of being a third-party "looking in", and of being very curious to know how the storyline would unfold. However, these sentiments were not universal: some interviewees commented that it was sometimes easier to project themselves into the scenario if there was no video. They found videos showing other people's reactions to be distracting; Text was preferred because their own imagination could take over.

> "[I could see myself in it] a lot better than if you watch a video. Sometimes it's like you're watching TV - you know, like you're taking it in, but you're not really saying 'what would *I* do in that situation?'." [N9]

These findings suggest parallels between interviewees' sense of empathic participation in the scenarios, and an audience's sense of theatre whilst watching a play or TV drama. The vision of "computers-as-theatre" (Laurel, 1993) is advocated by several e-learning designers as a way of engaging users. However, the computer-as-theatre metaphor is a double-edged sword: the sense of entertainment might be high, but the educational value might be compromised if learners take a superficial approach to the training material.

7.3 LEARNERS' STYLES-OF-ENGAGEMENT

As interviewees discussed the examples and reflected on their overall experience of the e-learning, it became apparent that they differed in the way they engaged with the material, and that these 'styles-of-engagement' influenced their interaction with the task and feedback in a systemic way. Furthermore, their experience of feedback relating to the immediately-completed task, and their subsequent re-assessment of its value, seemed to modify those styles-of-engagement for the next and subsequent activities.

Given the retrospective nature of the research design, it was not possible to conduct a micro-analysis which tracked styles-of-engagement for each activity. Nevertheless, some general comments can be made on the basis of interviewees' comments, and these are presented from section 7.3.1. Before doing so, it may be pertinent to refer to the concepts used in the educational literature to describe learners' orientations towards study materials, in order to situate the concept of 'styles-of-engagement' used in this thesis.

In his review of the orientations literature, Entwistle (1988) mapped the different ways in which student orientations were described, and their potential for generalisability. Concepts discussed included those of greatest generality such as *educational orientation*, specific concepts such as *approach to learning*, and also several mid-range concepts such as *learning styles* and *learning strategies*. The work of Dweck and her colleagues contributed to the literature on student orientations by differentiating between a performance orientation and a learning orientation (Dweck & Leggett, 1988; Dweck & Elliott, 1983), and the work of Marton and others distinguished between deep and superficial approaches to learning (e.g. Marton & Saljo, 1976, 1984).

Marton and Saljo's (1976) use of the term *approach to learning* comes close to the term *styles-of-engagement*, but is different in important respects. *Approach to learning* is a specific concept developed as a result of Marton's research on how students tackled a specific task of reading an academic article. The term describes what he saw as fundamental differences in the focus of students' attention when reading texts, which he described with reference to a deep:superficial dimension. The term 'approach' did not seem to be transferable to this research because of its overtones of a conscious strategy - an intentional action or plan. By comparison, the phraseology used by interviewees as they described their experiences of the e-learning reflected their 'ways-of-doing' and their styles of interacting and engaging with the content. Therefore, the term 'styles-of-engagement' was adopted to describe their recollections of how they engaged with the material.

The possibility that general orientations identified by other researchers might be relevant to learners' styles-of-engaging with e-learning applications was considered, and some parallels were identified. For example, interviewees' stated rationale for undertaking e-learning could be categorised as either *instrumental*, illustrated by comments such as "it's compulsory", "to earn

CE[21] credits", or *mindful,* illustrated by comments such as "to learn", "to understand". However, as interviewees recalled their experiences, the 'instrumental' and 'mindful' orientations no longer seemed adequate to describe the full range of interviewees' styles-of-engagement. Seven styles-of-engagement were identified, and were categorised on the basis of interpreted indicators such as expressed opinion and indicative phrases.

It was believed to be important to attempt such a categorisation because of the apparent influence of styles-of-engagement on interviewees' expectations of feedback. For example, those who were 'going through the motions' seemed less interested in the tasks, and therefore less interested in learning from the feedback, than was the case with 'mindful' learners.

Support for the importance of learners' style-of-engagement comes from the model of learner interaction with feedback proposed by Bangert-Downs et al. (1991), which was introduced in section 2.5.1 of the literature review. Their model proposed that mindfulness might be an important determinant of learning from feedback, but their research did not go further by conducting an empirical investigation of the forms which mindfulness (or its absence) might take, or its influence on learners' continued engagement with the training application.

The categorisations for styles-of-engagement were developed using tools such as NVivo and MindManager, as well as by manually reading transcripts and by using the memoing facility in NVivo. In addition, nascent categories were discussed with another PhD student in order to refine the developing categories. These procedures are discussed in chapter 5.

Learners' styles-of-engagement identified from this research are named below and described in sections 7.3.1 to 7.3.7:

- Mindful learning
- Looking for take-aways
- Exploring
- Watching TV
- Playing the game
- Getting through it
- Going through the motions

Findings indicated that interviewees shifted between two or even three styles-of-engagement during the course of their time spent on the application. Shifts between a mindful style-of-engagement to an instrumental one ('getting through it', 'going through the motions', or 'playing the game') were particularly frequent. There were probably many reasons behind the movement between styles-of-engagement, but interviewees' comments suggested that two were particularly important: length of continuous time spent on the e-learning (and consequent tiredness and loss of interest); and an assessment of the relevance and value of the tutorials and activities to their 'real-life' work settings. For example, some interviewees taking the business ethics course (*Navigating the Grey)* dismissed the educational value of the activities

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[21] "CE credits" refer to "Continuing Education" credits which are awarded to employees for completion of classbased training and e-learning. A minimum number of CE credits are required by employees each year as part of their personal training and development programs, and (in the case of auditors) are also a requirement of their professional associations.

which, in their view, failed to reflect the realities of their workplace environment. Some of those who continued to watch the videos "for a laugh" shifted to a 'Watching TV' style-of-engagement with the effect that feedback was entertaining rather than educational. When questioned, some interviewees acknowledged that even after the switch, subconscious learning may have taken place, because they did recall the feedback later on when a similar situation occurred in their workplace.

Comparisons between styles-of-engagement can be made by reference to two underlying dimensions: degree of learner-to-content interaction; and primary orientation.

The first dimension is the strength of interaction between learner and the e-learning content. For Moore (1989), learner:content interaction was --

> "... the defining characteristic of education. Without it there cannot be education, since it is the process of intellectual interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind". (Moore, 1989)

Moore emphasised the interaction as an *intellectual* process. However, in this thesis, use of the term 'learner:content interaction' is broadened to include both intellectual and *empathic* interaction. The definition therefore also includes the type of interaction which individuals feel when listening to an engaging story, during which time they might not be *intellectually* engaged, but they might nevertheless be engaged indirectly, for example by absorbing the value-system implicit in the story.

The second dimension relates to the learner's primary orientation whilst engaged with the training: rapid completion or learning. The term 'orientation' is inspired by the work of Dweck and her colleagues, who developed the concept in relation to children's goal orientation towards their schooling (Dweck & Elliott, 1983; Dweck & Leggett, 1988). Dweck found that the goals which children pursued influenced their interpretations of, and responses to events such as success or failure in learning activities. Similarly, findings from this research indicate that interviewees' orientations towards the e-learning influenced their responses to the feedback.

Dweck distinguished between two goal orientations: learning (in which individuals focus on improving their abilities) and performance (in which individuals are concerned with producing a positive evaluation of their performance). The learning orientation identified in this research resonates with the learning orientation defined by Dweck. However, Dweck's conceptualisation of a 'performance' orientation does not precisely fit the 'rapid completion' orientation identified in this research. The main reason for the difference is that in the e-learning applications studied, 'performance' in the form of gaining high marks was not necessarily a goal; users of *Navigating the Grey* needed only to complete the course to gain accreditation; *Zentoria* users needed only to pass a short test (after completing all the practice activities) which could in any case be repeated as many times as necessary to achieve the pass; and in *Coaching Advantage*, users could repeat any module they had 'failed'. With *Coaching Advantage* and *Zentoria*, no-one but the user knew the number of repeat attempts because only the final pass mark was submitted to the training office.

The seven styles-of-engagement are positioned against these two dimensions in figure 14, and shows a degree of overlap between styles. With more research, this model could be made more robust and more widely generalisable.

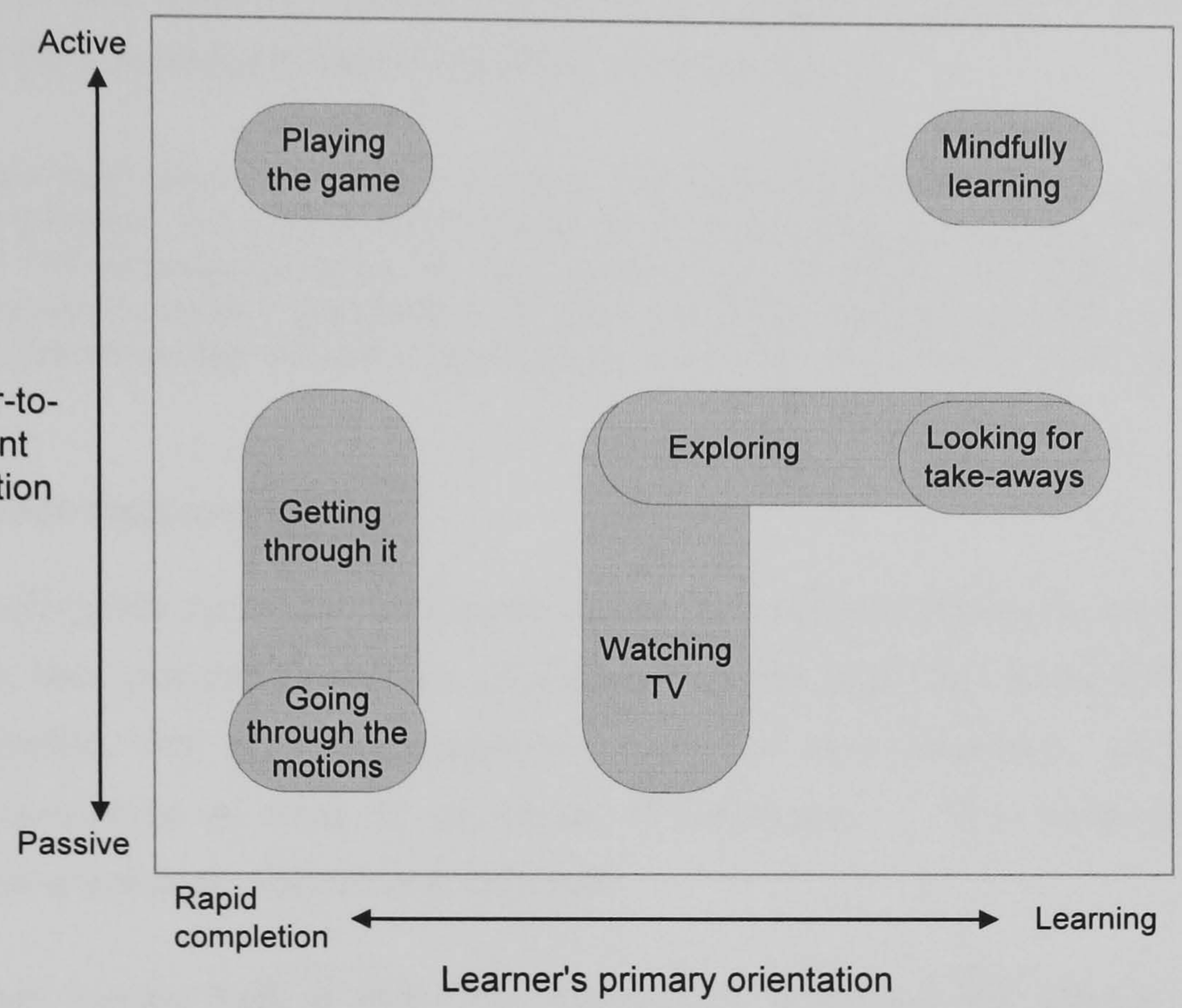


Figure 14: Styles-of-engagement by degree of learner-to-content interaction and primary orientation

The seven styles-of-engagement identified in this research context are described and illustrated in the following sections.

7.3.1 MINDFUL LEARNING

Mindful learning was an intentional, considered approach towards the e-learning material; and a desire to learn, rather than merely 'pass a test'. The research literature suggests that whilst some learners are predisposed towards a mindful approach, the local context and learners' specific motivations are also an important influence (Salomon & Globerson, 1987: 627), which seemed to be the case in this research. For example, whilst for some interviewees the stated rationale for the e-learning was mindful (e.g. "to learn"), for others it was instrumental (e.g. "to get more CE credits")

Media seemed to have a mixed impact. For some interviewees, video-consequences feedback which was rich in non-verbal information prompted them to think deeply about the implied 'moral of the story'. Others commented that text feedback prompted a more considered, thoughtful approach, because they could read and re-read it at their own pace. The importance of text's stability was also highlighted by Kozma (1991), whose research was discussed in the literature review.

> "I actually liked this. I could go back to things that were interesting to me. ... I think particularly for things that were thought-provoking, for me having the CBT was actually probably better than a classroom activity which might have been even more distracting. ... For me the fact that I could be kind of quiet and think about it, that worked good for me." [C6]

Some interviewees, who seemed to be predisposed to a mindful approach, indicated that the didactic nature of the e-learning feedback inhibited mindfulness.

> "I like to understand, you know. I like to have discussion or understand the underlying issues and principles. So maybe [what would have been better would be] a little more discussion of the rationale for what the right answer was, because - at least the way I approach problems - once I understand the rationale I can recreate it, when I need it, without having to remember what the issues were. And I can also extrapolate it." [N6]

7.3.2 LOOKING FOR TAKE-AWAYS

Interviewees adopting this approach were keen to learn quickly and efficiently, by accumulating behavioural rules, best practice guidelines, process checklists and other tools and take-aways. Interviewees adopting this style-of-engagement preferred text feedback, particularly if it provided crisp summaries of rules or principles of behaviour. This style-of-engagement favoured feedback which was didactic and concrete.

> "I know I keep coming back to this - key takeaways - because I just actually had a coaching session this morning and one of the things I realise now I didn't do is ask that person what they were hoping to get out of our conversation today [laughs]. It would have been nice if the feedback had given me a little crib sheet to remind myself of the five key questions I should ask, or something like that, in the right order." [C6]

7.3.3 EXPLORING

An *exploratory* approach was a playful approach to learning. When completing a task, interviewees sometimes selected a response option which they knew to be incorrect, out of a playful interest to see what the outcome might be. Only a small number of interviewees seemed to adopt this approach. An example from one who did is given below.

> "This was good because you had the opportunity to make your own choices. ... you could flip around and pick all the different options before you saw what the answer was. If it were like a conference, you might be less likely to say what you'd choose, in real life. The privacy gives you a little more freedom." [N8]

7.3.4 WATCHING TV

Interviewees who adopted a *Watching TV* style-of-engagement were usually emotionally immersed in the scenario, as though watching a TV drama unfold. Interviewees generally had an enjoyable experience, and were often positive about the e-learning although they did not seem to be mindfully trying to identify the key learning points. When prompted, some interviewees acknowledged that subconscious learning may have taken place, because they did recall the feedback when a similar situation occurred later in their workplace.

This style-of-engagement was not identified as significant when learners described their initial approach to the e-learning. However, because of a number of factors, some interviewees described a disengagement from the learning process. Findings indicated that these factors included a downgrading of the perceived value of the training because of ambiguous or poor-quality feedback, the use of too much multimedia, and by repeated activities which emulated theatrical storytelling. Those who nevertheless continued to enjoy the videos seemed to shift to a passive 'Watching TV' style-of-engagement with the effect that feedback was entertaining rather than ostensibly educational.

> "I enjoyed taking it, the time seemed to fly right by, it didn't seem to be a burden at all, just because of the video clips in particular, it was a very engaging. I was happy to sit there, to see what you guys were going to throw up at us" [C9]

These findings indicate that media has an influence on the degree of mental effort invested by learners on the e-learning feedback. The findings support prior research reported in chapter 2 by Salomon (1984) - including his concept of *amount of invested mental effort* or AIME - and by Lalley (1998), which concluded that in many circumstances learners engage more mindfully to textual information than graphical or video information.

7.3.5 PLAYING THE GAME

A small number of interviewees were *playing the game*. Their aim seemed to be to work out what the e-learning application 'wanted' from them, and then following that lead. A possible rationale for this strategy was that by thinking in tune, they hoped always to select the correct response (whatever their own preferred choice) and to finish the e-learning quickly and efficiently. This approach was intelligently instrumental. The intellectual challenge was not to learn from the instructional content, but rather to unravel and 'beat' the e-learning design.

> "I'm very good at sitting down in front of a computer and working out what should be said but it's very different when I get into a real life experience and have that stuff thrown at me." [C9]

> "I definitely learned what I *should* say. I soon worked that out. But that's not to say that I *would* say that in real life." [C12; emphasis in original speech]

7.3.6 GETTING THROUGH IT

Getting through it ('GTI') was an instrumental approach, whereby the interviewee wanted to 'get through' the e-learning application as quickly as reasonably possible, although there was an acceptance that they might learn something by completing the tasks. Many interviewees seemed to adopt this style-of-engagement at some point during the training - especially towards the end if they became tired or lost interest in the training. Findings indicated that adoption of the GTI style was influenced by: time spent on the e-learning (and consequent tiredness of the interviewee); estimated time-to-completion; their workload and other commitments; and the perceived value of the e-learning to the workplace setting.

> "I liked doing it all at once [rather than over several days] because I got it done with, and then I could get to work, and get my other stuff done." [N2]

> "Because it was at the end - I just sort of skimmed more. These were good examples, because these were more like things I might encounter. So I liked the examples and everything, but ... I tended to skim and go through it faster." [N8]

7.3.7 GOING THROUGH THE MOTIONS

Interviewees who were *going through the motions* ('GTTM') made swift guesses at the right answer, but were not particularly worried whether their responses to activities were incorrect or correct. They did not seemed to be perturbed about having to 're-do' tasks on a second attempt. This was a passively instrumental style, even more so than 'getting through it'. Although both GTTM and GTI were instrumental approaches, GTTM was passive, whereas GTI was a proactive approach aimed at completely the training quickly *and* correctly. The GTTM style is exemplified in the following quotes.

> "At the same time ... while I was listening to the audio, I was doing some tasks! Like mindless tasks, to keep me moving while I was listening to the audio. ... I wasn't doing anything else on the computer, but I did get up and empty the dishwasher [laughs]." [C14]

> "Shall I tell you what I did in reality? It was just taking so long, that I kept basically - if I was wrong, I backed up and picked the [other] right one. I was skipping. I just went back [and picked the other option]. [The feedback] was too long, and I didn't have the patience to sit there." [C3]

7.3.8 DISCUSSION RELATING TO LEARNERS' STYLES-OF-ENGAGEMENT

Comments from interviewees in studies 2 and 3 indicated that styles-of-engagement influenced learners' interaction with the e-learning application, which indirectly influenced their expectations of the feedback. For example, if a learner's style-of-engagement was active and motivated by a learning orientation, tasks would be more likely to generate a high sense of inquiry, stimulating questions and thoughts which translated into demanding expectations for the follow-up feedback. On the other hand, if a learner's style-of-engagement was passive and motivated by a rapid-completion orientation, tasks would rarely stimulate an active sense of inquiry. In those cases, feedback would be seen as something to 'get through'. Findings also indicated that

some learners revised their style-of-engagement after receiving feedback, for example if they were disappointed with the feedback and revised downwards their expectations of the usefulness of future e-learning activities.

The sample used in studies 2 and 3 is not sufficient to claim that the styles-of-engagement identified in this research are universally applicable to all e-learning situations. However, what can be argued is that the learners interviewed in this research interacted with e-learning applications using styles-of-engagement which influenced their expectations of feedback. Taking account of these findings from studies 2 and 3, the prototype conceptual framework proposed following study 1 was enhanced to reflect the importance of styles-of-engagement. Figure 15 highlights the new components in the conceptual framework in bold type.

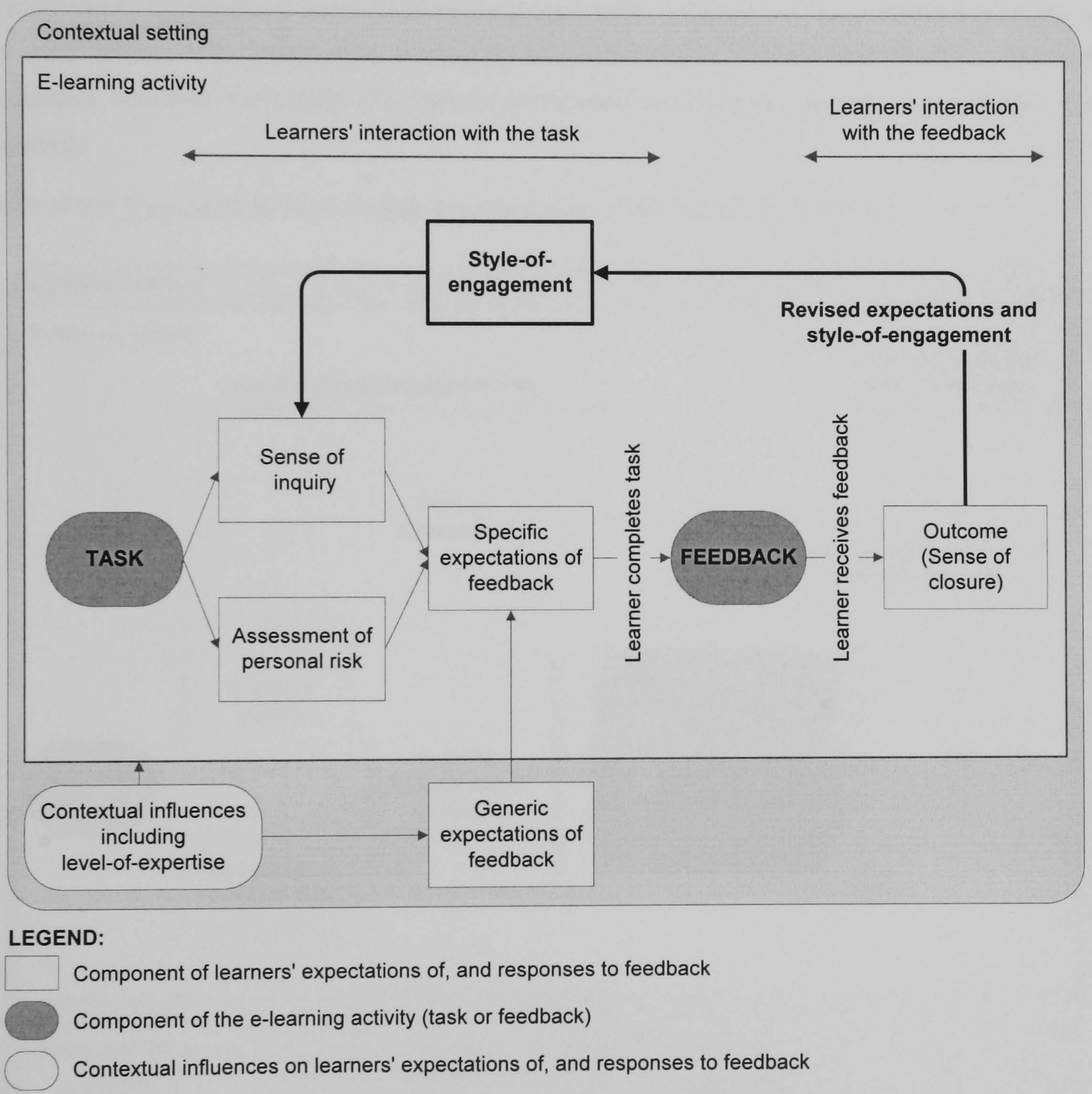


Figure 15: Conceptual framework representing learners' expectations of, and responses to e-learning feedback, revised to include style-of-engagement

The remainder of this chapter explores the influence of feedback's attributes on learners' sense of closure, and then distinguishes between the different outcomes which represent learners' sense of closure or non-closure.

7.4 INFLUENCE OF FEEDBACK'S ELABORATIVE ATTRIBUTES ON LEARNERS' OUTCOMES (SENSE OF CLOSURE)

In studies 2 and 3, interactions between learners' outcomes on receiving feedback and the attributes of feedback were investigated. Of particular interest was the influence of differences in the elaborative (i.e. non-verificational and instructional) attributes of feedback, since feedback elaboration has been recognised as an under-conceptualised aspect of feedback research (Kulhavy 1989, Mory, 1992, 1996). This research therefore sought to conceptualise the elaborative attributes of feedback which seemed important to interviewees.

Four elaborative attributes of feedback were identified in this research as influencing interviewees' outcomes on receiving feedback, as shown in figure 16. For completeness, figure 16 also shows that feedback's structural attributes (such as media) influence learners' outcomes; however, the impact of structural attributes was not systematically investigated in this research.

Each of the four elaborative attributes are discussed in the following sections.

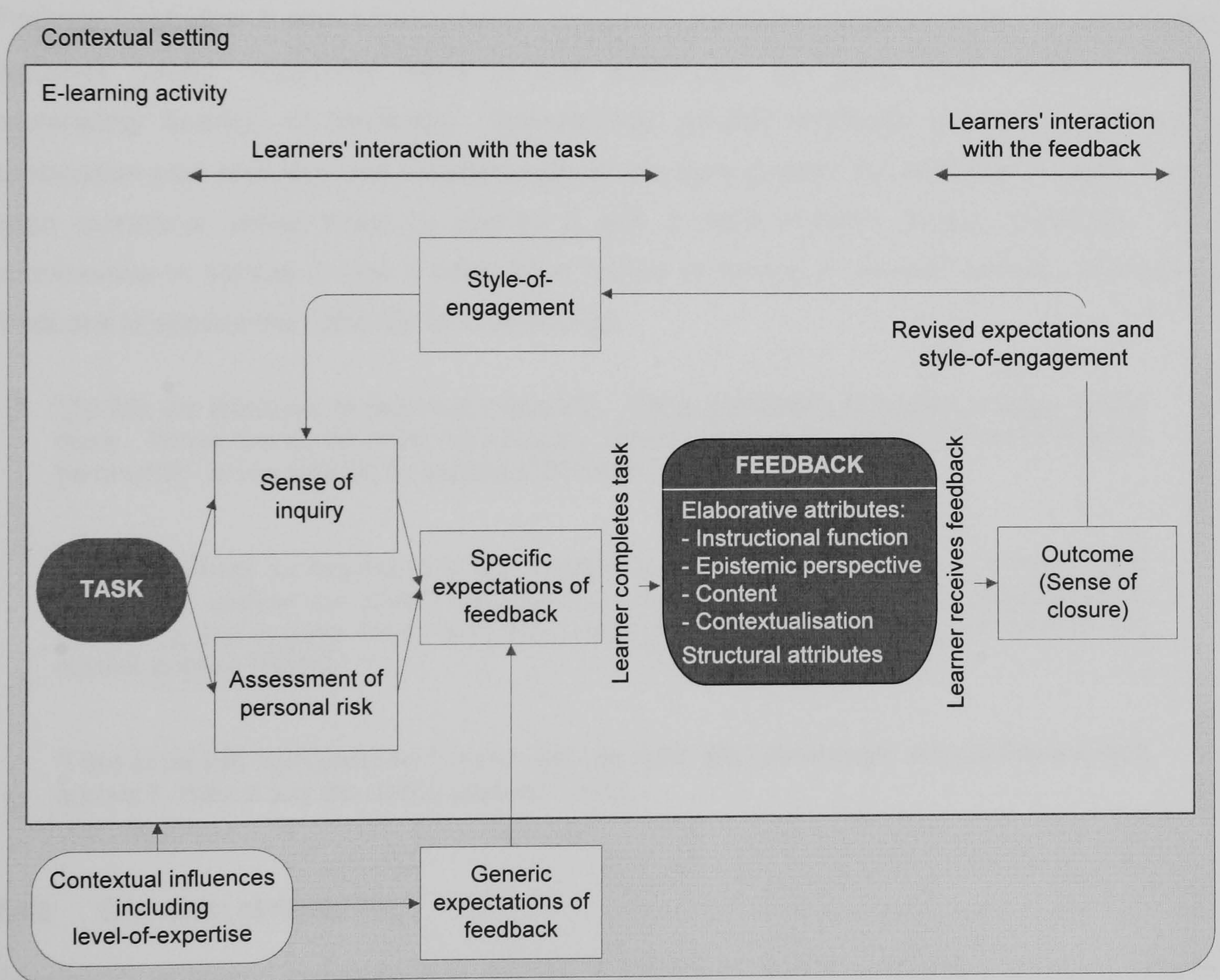


Figure 16: Conceptual framework representing learners' expectations of, and responses to feedback and identifying the elaborative attributes of feedback

7.4.1 INSTRUCTIONAL FUNCTION

The instructional function is defined as the mechanism by which e-learning feedback tries to 'teach', and is usually understood in the context of the function's referential theory of learning: reinforcement in behaviourist theories; error-correction and explanation in information-processing theories; an aid to reflection and construction of knowledge in constructivist theories; and dialogue in socio-constructivist theories (Askew & Lodge, 2000; Jonassen, 1991; Mory, 1992, 1996; Kulhavy & Wager, 1993).

Findings from study 1 indicated that learners wanted more from feedback than could merely be explained by its instructional function. What they sought was a sense of closure, and feedback's instructional function was just one of several components which needed to match their expectations before closure could be achieved. Findings from study 1 also indicated that, influenced by their sense of inquiry, APR and level-of-expertise, interviewees expected feedback to reinforce, correct behaviour, explain or promote reflection. Mindful novices and many experts wanted feedback to be more discursive, although novices more than experts tended to want the security of being told a "correct" answer.

Findings in studies 2 and 3, for example based on interviewees' discussions on what makes feedback 'useful', supported these general tendencies, but gave more emphasis to the explanatory function of feedback. Interviewees' greater emphasis on the importance of explanation was probably due to differences in the style of task: the activities in study 1 used open questions, whilst those in studies 2 and 3 used multiple choice questions. Most interviewees in studies 2 and 3 interpreted MCQs as having a 'correct' answer, and wanted feedback to explain the rationale for that answer.

> "[I'd like the feedback to be] more elaborate. Not a paragraph, but just to explain a little more. Those two words were not enough. I like to have more detail. It doesn't need to be overkill. Just a little bit, to expand a bit more." [N2]

> "The usefulness [of feedback] is that it helps to clarify the learning, so ... if I've chosen the wrong answer it's useful because it's validating again that I've misunderstood something and helping me to understand that piece and then directing me towards the correct answer." [C14]

> "I like to be told right away so I know - did I do right, did I do wrong? Why is this the right answer? Why is this the wrong answer?" [C3]

7.4.2 EPISTEMIC PERSPECTIVE

Feedback's epistemic perspective is defined in this thesis as the perspective implicitly adopted by the feedback with regards to the nature of knowledge and learning. Interviewees' preferences with respect to feedback's epistemic perspective were evident along two dimensions: dualistic:relativistic and experiential:analytic.

Dualistic:relativistic dimension

The dualistic:relativistic dimension draws on Perry's (1970, 1981) work on the intellectual and ethical development of college students. By interviewing students at different stages in their college life, Perry and his colleagues identified a developmental progression in students' development which began with dualism, and moved through multiplicity and relativism towards commitment. The different stages in this development were conceptualised as "coherent interpretive frameworks through which students give meaning to their educational experience ... and [which] color their motives for engagement and disengagement." (Perry, 1981: 77).

In recent years, criticisms have since been raised about Perry's scheme (e.g. Moore, 1989; Belenky et al., 1997). In spite of these important critiques of Perry's scheme, his portrayal of the fundamental shifts in students' perspective provides a useful heuristic framework for interpreting the interactions between learners and e-learning feedback.

Perry described dualism as a "division of meaning into two realms - Good versus Bad, Right versus Wrong. ... Right Answers exist *somewhere* for every problem, and authorities know them". Relativism was described as "diversity of opinion, values and judgement derived from coherent sources, evidence, logics, systems, and patterns allowing for analysis and comparison ... knowledge is qualitative, dependent on contexts." (Perry, 1981: 79-80). Perry's description of dualistic and relativistic positions resembled differences seen in this research between novices' and experts' responses to feedback. For example, several novices indicated that they were confused by feedback that did not explicitly state the key learning points. On the other hand, several intermediates and experts expressed dissatisfaction with feedback which they felt was overly-prescriptive and dualistic; they wanted feedback which recognised the possibility of alternative ways of dealing with business problems, dependent on the local circumstances and people involved.

However, there were also instances of experts wanting dualistic feedback. For example, in legal and compliance matters, several experts commented that a definitive policy should be clearly communicated to all staff, because of the potential seriousness of non-compliance behaviour.

Experiential:analytic dimension

The experiential:analytic dimension draws on Kolb's (1984) work on experiential learning. Kolb crafted a synthesis of the work of previous authors such as Lewin and Dewey, and contributed his own theoretical and empirical work. He conceptualised experiential learning as a cycle involving concrete experience, reflective observation, abstract conceptualisation, and active experimentation. In this thesis, the 'experiential:analytic' dimension of feedback describes whether feedback portrayed simulated experiences or whether it presented abstract analysis.

Findings from this research, including study 1's comparisons of non-verificational feedback designs, suggested that many interviewees wanted feedback to be more supportive of experiential learning. Business learners' preference for experiential learning was also supported by Kolb's comparative research on the learning styles of graduate students (Kolb,

1984: 86). However, some interviewees raised doubts about their ability (or the ability of others) to learn from experiential feedback without the supplementary benefit of analytic feedback. Evidence for this proposition came from an analysis of interviewees' comments about *Coaching Advantage* and *Navigating the Grey* feedback examples, which is discussed in the remainder of this section.

Study 2: Coaching Advantage. Activities selected for *Coaching Advantage* differed in their reliance on analytic or experiential (vicarious by use of video) feedback. Feedback for examples CA1 and CA3 was didactic and analytic: they verified the learner's response ("correct" or "incorrect"), and then gave a logical explanation for that verification; for example by reference to rules and principles of coaching. Feedback for CA2 combined analytic and experiential feedback: it began with text introducing the key learning points, and concluded with a video 'playing out' the selected response option and showing the likely consequences of that intervention.

Interviewees overwhelmingly preferred the CA2 style of feedback. Ten expressed satisfaction with CA2, compared with six for CA1 and two for CA3. Positive comments in favour of CA2 feedback tended to be about enjoyment of the video rather than its educational value, whilst positive comments in favour of CA1 and CA3 feedback tended to be about their analytical style. These responses may have broader implications about whether (vicarious) experiential feedback necessarily prompts reflective thought, which is important if experience is to result in changed behaviour (Fenwick, 2000, 2001; Laurillard, 2002: 129). Three of the interviewees explicitly mentioned their concern that the video-consequence feedback would have been inadequate without the text.

Study 3: Navigating the Grey. Five interviewees expressed satisfaction with examples NtG1 and NtG2 (which both used video + limited amount of text), whilst three expressed satisfaction with example NtG3 (text only). Comments from interviewees discussing the three activities in *Navigating the Grey* were similar to those from study 2. Many interviewees expressed a preference for feedback which used video, over feedback which relied solely on text; however, on further analysis, satisfaction seemed to be as much to do with feedback's entertainment value than its educational value.

Interviewees who were satisfied with examples NtG1 and NtG2 were principally novices, and from operational support units. Satisfied interviewees tended to describe themselves as having adopted a 'Watching TV' style-of-engagement. Comments from these interviewees suggested that although they had enjoyed the video-consequence feedback, they had not necessarily abstracted any key learning points which could be transferred to new situations. Interviewees' comments indicated that experiential feedback, whilst enjoyed, was not necessarily instructive. Several experts commented that examples NtG1 and NtG2 were incomplete because they did not explicate the underlying issues or the key learning points.

With regard to NtG3, which used text and was more analytical than NtG1 and NtG2, mindful novices and intermediates made a point of expressing satisfaction with the analytic text, because it facilitated reflection as they read and re-read the text at their own pace. Experts,

however, were critical of the content of the feedback message, which they felt did not go far enough to explicate the key issues. Three of the less mindful interviewees (novices and intermediates) were primarily concerned about "missing out" on the entertaining videos.

One possible explanation for the mixed responses to experiential and analytic feedback is that 'mindless' novices and intermediates were distracted by the videos, and lacked the knowledge and ability with which to critique the educational inadequacies of the feedback - they didn't realise how much they didn't know.

7.4.3 CONTENT

The second attribute of feedback - content - is defined in this thesis as a composite of the specific content pertaining to the topic, and the manner in which it is covered. It is not possible to generalise about topic-related content given its specific nature, but several common themes emerged regarding learners' expectations of the manner in which the content would be covered. In this thesis, these themes have been classified as relating to:

- Granularity
- Coverage (coverage of issues, process and conditionality; and retrospective coverage)

Granularity

Granularity of the feedback message is defined in this thesis as a dimension which ranges from concrete to conceptual. In the feedback examples discussed with interviewees, concrete feedback tended to be detailed and specific to the task; conceptual feedback tended to discuss the underlying principles and concepts which were relevant to the task.

Interviewees differed in the way they responded to the granularity of the feedback. Using *Coaching Advantage* as an example, four interviewees of medium to high levels-of-expertise commented on their dislike of concrete feedback, expressed either frustration or dismissal on receiving it, and indicated that they would have preferred conceptual feedback. Only one interviewee (C9) of medium expertise welcomed concrete feedback because it was explicit and very clear about the key learning point. Other interviewees in study 2 made no comments about granularity.

Coverage

Three aspects of coverage - **issues**, **process** and **conditionality** - were expected by some learners, but were particularly important to experts and others who recognised the complex and situated nature of business problem-solving. These learners expected coverage of the main *issues* pertaining to the problem, the problem-solving *process* including explication of goals, and the *conditionality* of the proposed solutions including consideration of "what if?" scenarios. The importance of providing feedback relating to the process of problem-solving - and not just to the solution of a problem - was also raised by Jonassen (1997), and was discussed in section 2.6.2. Satisfaction depended on the extent of feedback's coverage in these three areas.

Retrospective coverage related specifically to multiple choice questions ('MCQs'). Having been told the correct answer, learners were often curious to know why the other response options were incorrect. This was especially important with complex problems, since the MCQ distracters were sometimes very plausible. Satisfaction depended on the extent to which feedback retrospectively covered each response option in turn, explaining the rational for its correct or incorrect designation. Retrospective coverage was also important to learners who had successfully guessed the right answer, but who did not understand why it was correct.

Lack of retrospective coverage was cited by interviewees of low level-of-expertise, as shown in tables 21 and 22.

Level-of-expertise ↓

Interviewee grade	# interviewees citing lack of retrospective coverage as problematic (a)	Total number of interviewees per grade (b)	(a)/(b) expressed as a percentage
Grade 3	3	4	75%
Grade 4	2	6	33%
Grade 5	2	6	33%
Grade 6	0	1	0%
Grade 7	0	1	0%

Table 21: Number of Coaching Advantage *interviewees citing as problematic the lack of retrospective coverage in any of the three feedback examples*

Lack of retrospective coverage in example NtG1 was a deficiency mentioned by many interviewees in study 3. Example NtG1 showed 'correct response' feedback: a video showing the outcome of the correct multiple-choice option, plus a short piece of confirmatory text. Many interviewees were left unsure as to why the incorrect response options were indeed incorrect.

Level-of-expertise ↓

Interviewee grade	# interviewees citing lack of retrospective coverage as problematic (a)	Total number of interviewees per grade (b)	(a)/(b) expressed as a percentage
Grade 1	3	4	75%
Grade 2	2	4	50%
Grade 3	1	2	50%
Grade 4	1	2	50%
Grade 5	0	1	0%

Table 22: Number of Navigating the Grey *interviewees citing as problematic the lack of retrospective coverage in example NtG 1*

7.4.4 CONTEXTUALISATION

In this thesis, contextualisation is defined as the relating of feedback to the circumstances in which it applies. Interviewees' satisfaction depended on the extent to which feedback was perceived as grounded in reality and relevant to their workplace.

Interviewees who commented on feedback's contextualisation were more often than not critical rather than complimentary, particularly when comparing e-learning feedback with the dialogue which typically occurs amongst participants of class-based training. For example, interviewee N11 commented that as class participants become comfortable with each other, they give more comprehensive and "revealing" information about problems that have occurred in their workplace and about the attempts to resolve those problems. When comparing class dialogue with the feedback given for example NtG2, she commented:

> "What's happening here is that we're not getting to some of those revealing issues or day-to-day everyday occurrences. This feedback doesn't feel real; it's too textbook. I can't use it or take anything away from it because it just doesn't relate to the type of environment I work in." [N11]

7.5 LEARNERS' OUTCOMES ON RECEIVING FEEDBACK

It has already been argued that interviewees' primary expectation of feedback was that it would enable them to achieve a sense of closure. However, to achieve closure, the attributes of feedback needed to match interviewees' expectations.

As part of studies 2 and 3, interviewees' responses to feedback were further analysed in order to identify interviewees' outcomes, and to investigate the extent to which they represented a sense of closure. The aim was to investigate relationships between feedback's attributes and interviewees' outcomes in order to reveal more about interviewees' expectations of feedback. Of particular interest were interviewees' outcomes when closure was *not* achieved. This is because, as phenomenologists have argued, it sometimes takes a breakdown or failure of expectations before our taken-for-granted assumptions and expectations are revealed (Heidegger, cited in Winograd & Flores, 1986).

Interviewees' outcomes were categorised in studies 2 & 3 (and later in study 4) on the basis of indicators such as expressed opinion and indicative phrases, and using procedures outlined in chapter 5. Findings indicated that two dimensions could be used to explain interviewees' outcomes: firstly, degree of closure or non-closure; and secondly, interviewees' sense of self-confidence or deference regarding the implied authority of the e-learning content. These dimensions are discussed in the next section, which is followed by a presentation of the outcomes themselves.

7.5.1 DIMENSIONS UNDERLYING LEARNERS' OUTCOMES

The dimension of closure:non-closure reflected interviewees' evaluation of each specific activity, and of the ability of feedback to generate a sense of closure. Outcomes were either positive if closure had been achieved ('satisfied'), or negative if closure had not been achieved. Findings also indicated that negative outcomes varied in the degree of perceived non-closure, and differed in their emotional qualities. Negative outcomes manifested themselves in four ways: confusion; a sense of the incompleteness of the feedback; frustration; and dismissal of the validity of the feedback message.

A possible explanation for the variability in emotional qualities is that interviewees differed in what Lockwood (1992) has called the confidence:deference dimension. In his study of activities in self-instructional texts, Lockwood (1992) found that learners differed in their willingness to challenge the author's point of view. The designs of some of the activities studied were intended by their authors to challenge previous conceptions and encourage learners to think for themselves. Activities were designed to allow learners to formulate responses which might differ significantly from the view offered by the author, but which might be equally valid. Lockwood found that not all learners grasped these opportunities, nor had confidence in their own response. Some, upon discovering that their initial response to an activity differed from the author's, abandoned their own response and adopted the author's, without reflecting further or attempting to resolve the differences of opinion (Lockwood, 1992: 109-110). The dimension

confidence:deference has parallels in Perry's (1970, 1981) differentiation between relativistic and dualistic students' attitudes towards authority.

In this research, based on an interpretation of interviewees' comments when closure was not achieved, the outcomes of dismissal and confusion were positioned at each end of the confidence:deference dimension. Interviewees who deferred to the implied authority of the e-learning content, and who tried hard to make sense of the feedback, were often left confused if the sense of cognitive dissonance was too great. Interviewees who were confident in their own opinion, having what Ellis and Kruglanski (1992) have described as a strong sense of "self-ascribed epistemic authority", seemed likely to dismiss dissonant feedback without reflecting seriously on it. Interviewees' apparent position along the confidence:deference dimension correlated to some extent with their level-of-expertise.

Interviewees' interpreted outcomes on receiving feedback are represented in figure 17 against the two dimension of closure:non-closure and confidence:deference. The six outcomes are described in subsequent sections.

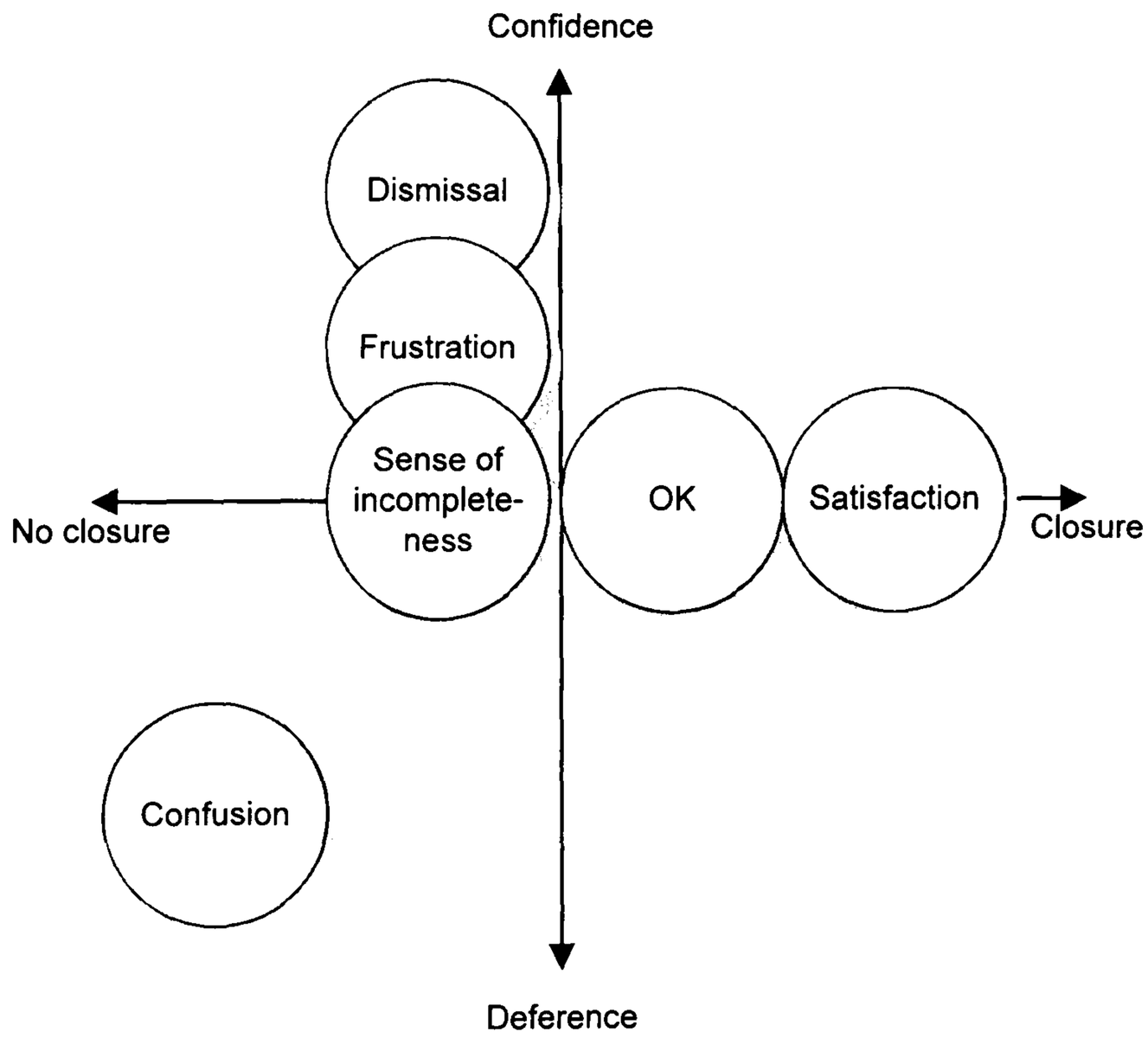


Figure 17: Learners' outcomes on receiving feedback, compared against dimensions of closure:non-closure and confidence:deference

7.5.2 SATISFACTION

The outcome of satisfaction is broadly defined in this thesis as a learner's positive evaluation of feedback. Comments from satisfied learners indicated a sense of closure, achieved after receiving feedback which met their expectations. When reflecting on the feedback, satisfied interviewees attributed their positive evaluations to elaborative attributes of feedback, as well as to the type of media used, which is defined in this thesis as a structural attribute. Although

elaborative attributes are the primary focus of this research, interviewees' comments about media are also discussed in this section.

When interviewees were satisfied with feedback, they spoke mainly about its instructional function. However, different interviewees praised different aspects of feedback's instructional function, pointing to variations in interviewees' expectations of feedback. For example, whilst some interviewees praised experiential feedback which prompted them to reflect on the issues surrounding a business problem, others who expected didactic feedback found the same example too ambiguous and were therefore dissatisfied with it.

Interviewees were positive about feedback which gave them the choice of whether to receive supplementary information. For example, many interviewees liked the hyperlink functionality of the *Coaching Advantage* feedback, which allowed them to see more information about the feedback message if they chose to follow the link. This finding implies that a layered approach to the design of feedback may be more satisfactory than a block-text approach. Several interviewees spoke about wanting control over the type of information they received such as the depth of explanation and the level of granularity; they wanted to be able to chose the layer of feedback which was most suitable to their immediate needs and expectations.

The use of media influenced interviewees' satisfaction in different ways: some preferred feedback which used video because it portrayed non-verbal behaviours, and was also entertaining; others preferred text because it allowed time for re-reading and reflection.

> "[Re. NtG1] It's good to have the video, and seeing how he responds to her ... It's like the idea of reading a play - you can read the words, but you don't get the subtle connotations of what they're saying and what they're doing. So when you actually get to see it, you can see how they're responding. It's like reading an email, you can't put the emotion into it, so it's nice to be able to see what they're actually thinking behind the words." [N8]

> "And this one [NtG3] - I know this one didn't have the live animation, and the people talking, and I don't know if that had something to do with it - having to read through the captions to get an understanding of what was going on - maybe that caused it to be more interactive than the others, and helped to reinforce it a little bit better." [N1]

7.5.3 SENSE OF INCOMPLETENESS

The category of outcome called 'sense of incompleteness' comprised interviewees' responses to feedback which resulted in non-closure, but not to the extent of creating confusion, frustration or dismissal. Findings suggested that interviewees' sense of incompleteness related mainly to perceived deficiencies in feedback's instructional function, epistemic perspective and content. Examples are given in the following paragraphs.

A deficiency of instructional function was indicated by interviewee N12 when discussing example NtG2. N12 expected explanation; yet the feedback gave only verification, and relied on the learner to infer the key learning points.

> "I mean you could have elaborated on that more and say *why* exactly it wasn't the best solution... Basically this one just says 'This is wrong, there's a better solution, try again'. It doesn't really say why. That's one thing I noticed throughout is that - when you got one wrong - I mean it more or less just states it back to you and says, 'try something else'. It really doesn't say why". [N12]

Other interviewees commented on inappropriate use of experiential feedback, when analytical feedback would have been more suitable. This deficiency was particularly evident with *Navigating the Grey*, which used video to portray problem scenarios and solutions. Interviewees often enjoyed the videos as experiential manifestations of real-world problems, but felt that the feedback was incomplete because the underlying learning principles were not drawn out using a text-based analysis.

For other interviewees, content was perceived as deficient compared with expectations. Some interviewees - particularly those with higher levels-of-expertise - commented on feedback's poor coverage of the underlying issues. Commenting on NtG3, N6 complained that:

> "They [the big-picture messages] never came out in the summary or the debrief. ... Looking at the comment on the bottom of the page 'use good judgement in determining when to ..' well, that's obvious! ... Nobody took this CD and purposefully uses bad judgement, so without a bit more of a discussion as to why ...The explanation [for NtG3] assumes that you already knew the right answer." [N6]

Comments on feedback's lack of retrospective coverage were common. In this thesis, feedback is defined as having retrospective coverage if it addresses each of the MCQ response options, and not just the option selected by the learner. It became apparent in studies 2 and 3 that feedback was sometimes perceived as incomplete if it failed to 'close off' the thoughts and questions which had been raised in interviewees' minds by the task as they considered <u>all</u> the available response options. Although feedback usually gave an explanation if the option selected by a learner was incorrect, many of the learners interviewed wanted to understand why the other options were also incorrect. Even if the correct answer had been selected, some interviewees were not sure if they had chosen it for the right reasons; they wanted feedback to explain why it was correct.

> "I'd like to have a little more feedback [for NtG3] saying why the other ones weren't correct, so you can narrow it down. You might know you're correct, but how do you know something else might not be equal to it. ... I'd just have liked to narrow my options down, so that I'm certain, and the feedback didn't provide that for me. It just said 'Great move' or whatever." [N2]

> "What I would have liked is for it to come up with all the questions and possible answers at the same time. Especially when it's incorrect. I would have loved, you know, not only an explanation of why what I got was correct, but once you got it correct, what was wrong with the other two answers? because when I wasn't sure and I was guessing it was very nice that I got it right and I could go on, but I would have loved to have been able to sort of click on the other two and see what was incorrect about them." [C11]

Other interviewees expressed dissatisfaction with feedback's emphasis on the problem's *solution*, as opposed to the *process* of arriving at that solution. Interviewee N7, for example, was concerned that with complex problems there is rarely a single correct answer applicable in all circumstances, and that feedback which purported to offer a universal solution might be

misapplied by novices. She also indicated that feedback should cover the process of problem-solving rather than merely give the solution.

7.5.4 FRUSTRATION

Interviewees who did not achieve a sense of closure sometimes expressed frustration. Frustration involved an element of stress, which seemed to be caused by several factors: logistical problems, impatience, annoyance with repeated flaws in the feedback, or irritation with the tone of the feedback.

Some interviewees described their frustration with feedback which contained too much information, or used too many screens to communicate its message. Often, these interviewees went on to recommend more chunking or layering of information, giving control to the learner to select feedback which suited their needs and expectations. For example, the structure of NtG2 provoked frustration with some interviewees because it lead the learner down several error paths before suggesting a suitable solution. Interviewee N11 talked about "the frustration with having to go through a number of screens to get to the answer", and wanted feedback which came to the right answer "much faster, much more quickly". Comments from these interviewees suggested that they expected a shorter piece of didactic feedback than the through-provoking feedback they actually received.

Other interviewees were frustrated by the tone or language of the feedback message. Some commented on its "academic, university-like" [C3] tone, or complained about what they perceived as an inappropriately dualistic style. Such comments tended to come from interviewees with high levels-of-expertise.

Frustration was also a common response for interviewees who felt that their own response to the question was right in the circumstances which they had in mind when responding to the task. Their frustration seemed to be due to annoyance at being told they were 'wrong' when they believed they were right, and of not being able to defend the viability of their proposed solution.

> "I'm sure it is probably the best answer, but in my opinion I felt I could handle it in a similar fashion just as well". [N3]

The practical difficulty of devising computerised routines for assessing the viability of learners' alternative solution has been acknowledged by Jonassen (1997) and Kulhavy and Wager (1993). Nevertheless, the implication from this research is that learners may become frustrated with didactic and inflexible feedback, which in turn may reduce their perception of the value of the training, and their subsequent engagement with it.

7.5.5 CONFUSION

There were occasions, on receiving feedback, when interviewees admitted to being *less* sure of their understanding of the scenario and issues than they were before attempting the answer. They seemed confused by what appeared to be conflicts between the feedback and their own

experience and knowledge, and seemed to experience a greater sense of non-closure than that experienced by interviewees who were frustrated, dismissive, or who felt a general sense of incompleteness.

Novices sometimes expressed confusion with feedback examples which experts had dismissed as invalid. Experts seemed to use their judgement and prior knowledge of the topic to assess the validity of the feedback, and they dismissed feedback if it lacked credibility. (This is discussed in more detail in section 7.5.6). Novices, on the other hand, seemed to try to make sense of it in the belief that it was 'right', but they sometimes became increasingly confused.

Some interviewees were confused by relativistic feedback which they perceived as ambiguous. An experienced consultant talking about *Navigating the Grey*, and recognising the difficulties of novices, commented:

> "From my perspective [the feedback overall] was great because again it's still grey and there is no right answer. But I think to a lot of lower level people it would be very confusing, because if there is no right answer -. ... On one of [the activities] I know that I picked the two wrong answers first. And I can handle that because I know that ethics is pretty esoteric - and I'm more seasoned - but for a young person straight out of college, it might be confusing, thinking well 'how do I know the right answer? you're supposed to tell me what's right and wrong, and even in this scenario you can't tell me'." [N7]

Finally, some interviewees became confused if the feedback message was more complex than they had expected, and presented too many interwoven issues. Commenting on NtG2, one of the longest examples:

> "I think it confuses the issue.... It has too many dilemmas for this section. It should have just stopped after the main one, because it just takes your attention away from the key take-away. It gives you more than one key take-away, and for each section I think there should only be one key take-away or [else] the person doesn't remember." [N7]

7.5.6 DISMISSAL

When learners dismissed feedback, there was a sense that they were rejecting its validity. Interviewees sometimes rejected feedback for the straightforward reason that they thought it was wrong, but often their reasons for dismissal were more complex.

For example, some interviewees dismissed feedback which they felt was irrelevant to their own circumstances or was culturally or politically insensitive. For example, three interviewees commented that the response options in CA2 expressed rather 'hard' ways of speaking to one's protégé. Because the options did not fit their own management style, the validity of the feedback was also called into question.

> Sometimes I chose the wrong answer because it was a little softer to start things off. ...[When I received the feedback], I tried to understand it. ...In a couple of spots you know I really tried to understand what the point was, what they were really trying to say between the two, and occasionally I dismissed it because I just couldn't either see the point or I just strongly disagreed with the style based on the situation." [C8]

Other reasons for dismissal of feedback were that it was perceived as too concrete and not sufficiently conceptual, it lacked adequate coverage of the main issues, and it was poorly

contextualised. These were all identified as important aspects of learners' expectations of the elaborative attributes of feedback, and were discussed in section 7.4.

These findings resonate with prior research by Chinn and Brewer (1993), who investigated the response of science students to "anomalous" data which contradicted their existing, naïve theories about the physical world. Their research was prompted by doubts about the effectiveness of instructional strategies which present students with anomalous data: such strategies aim to cause students to become so dissatisfied with their existing theories that they come to adopt the target scientific theory which successfully explains the data. However, Chinn and Brewer (1993) found that students often find ways to discredit and dismiss the anomalous data in order to protect their existing beliefs; for example by rejecting it or by reinterpreting it in ways which supporting their existing beliefs and theories.

Chinn and Brewer's research has important implications for an interpretation of findings from this research, particularly since their historical investigations found that experienced scientists as well as students reacted in similar ways to anomalous data. Implications for this research are that business learners may be dismissing feedback not only for 'legitimate' reasons such as inadequate coverage of the main issues, but because they are resisting challenges to deeply-held beliefs. Self-paced e-learning is likely to be ill-suited to facilitate fundamental belief change, and hence learners' dismissal of feedback may be more common than instructional designers anticipate.

7.5.7 OTHER OUTCOMES

The categories of outcome defined and illustrated above were identified on the basis of the sample interviewed. They are not proposed as an inclusive list which is universally generalisable to other empirical settings, although the dimensions of closure:non-closure and confidence:deference may have wider applicability.

Two additional categories were created for this sample to account for outcomes which did not fit the substantive categories already mentioned.

- "OK" categorised the few instances when interviewees expressed a modest but somewhat ambivalent sense of being positive about the feedback.
- "N/C" categorised feedback examples for which no comment was made. The outcome of "N/C" is not represented on the confidence:deference / closure:non-closure matrix.

7.6 DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

At this point in the chapter, the main components of the conceptual framework have been introduced and discussed. It may therefore be useful to consolidate these discussions by elaborating the framework with the categories identified for the main components. This is done in figure 18, which also specifies the sections of this thesis which relate to each component.

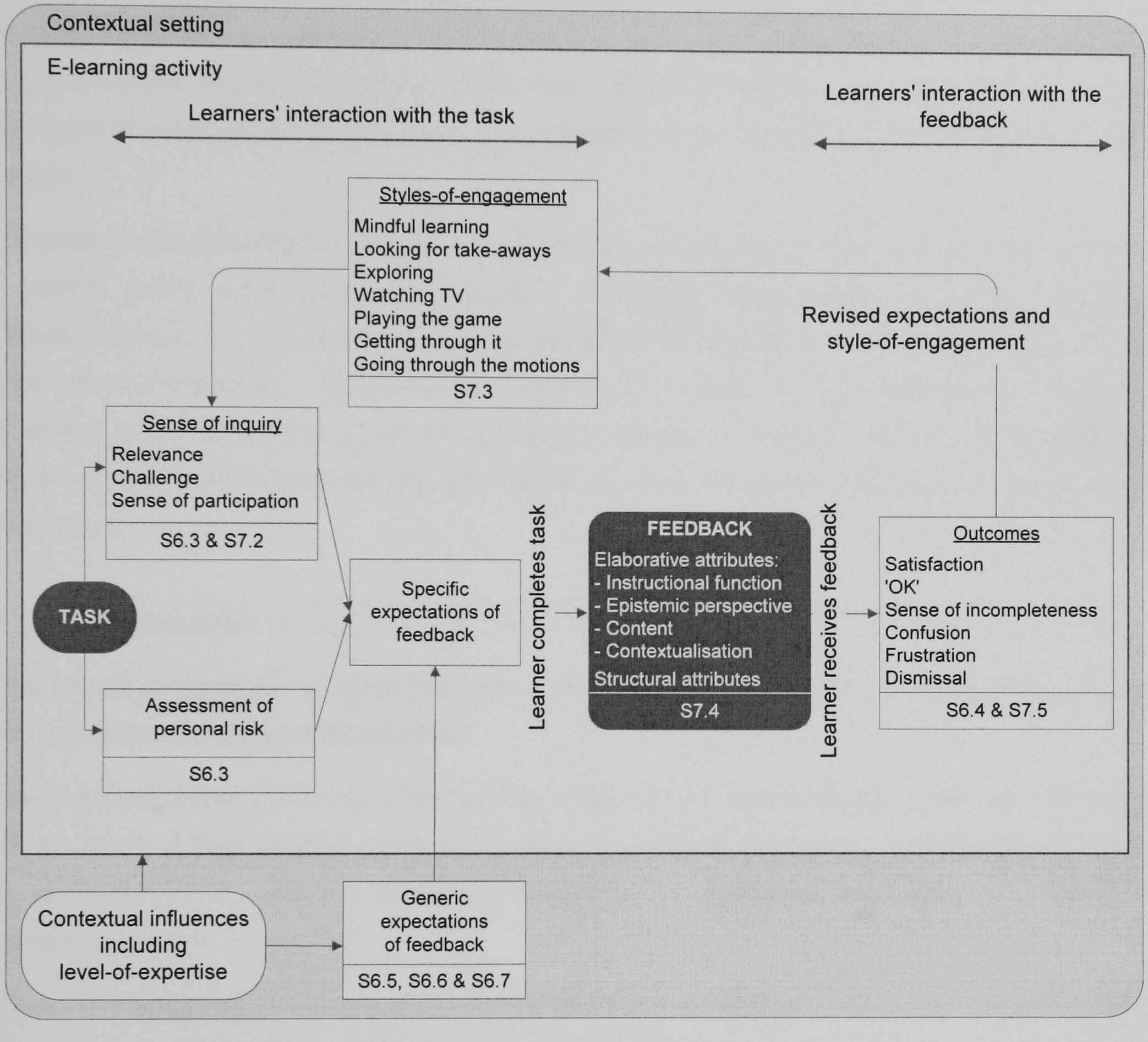


Figure 18: Conceptual framework representing learners' expectations and responses to e-learning feedback, mapped to relevant sections in this thesis

The remainder of this chapter briefly discusses interactions between styles-of-engagement, outcomes and level-of-expertise, and then identifies the main themes from studies 1, 2 and 3 which were used to develop the five hypotheses tested in study 4.

7.7 INTERACTIONS BETWEEN STYLES-OF-ENGAGEMENT, OUTCOMES AND LEVEL-OF-EXPERTISE

Interaction analysis is usually the preserve of experimental research which can control for, and separate out, the influence of each independent variable on the dependent outcome. Studies 2 and 3 were exploratory rather than experimental. The purpose was to identify factors which seemed to be important in explaining interviewees' outcomes on receiving feedback, and this purpose required a qualitative focus using a relatively small number of subjects. A comprehensive interaction analysis would have required a different research design. Larger numbers of subjects would also have been needed in order to achieve statistically-meaningful results.

Although a comprehensive interaction analysis was not feasible nor intended for this exploratory research, efforts were nevertheless made to investigate the possibility of strong interaction effects between interviewees' style-of-engagement, their outcomes on receiving feedback, and their level-of-expertise. Furthermore, since study 3 included interviewees from different business units - consulting, audit and operational research & support - analysis was carried out on the extent to which business unit seemed to influence interviewees' styles-of-engagement or outcomes.

7.7.1 PROCEDURE

The search for evidence of interactions was based upon transformations of the qualitative codes for outcomes and styles-of-engagement.

Interviewees' outcomes for each feedback example were transformed into numerical weightings on the basis of their position along the 'closure:non-closure' dimension: satisfaction = 2; OK = 1; confusion = -2; and the remaining categories of dismissal, frustration, and sense of incompleteness = -1.

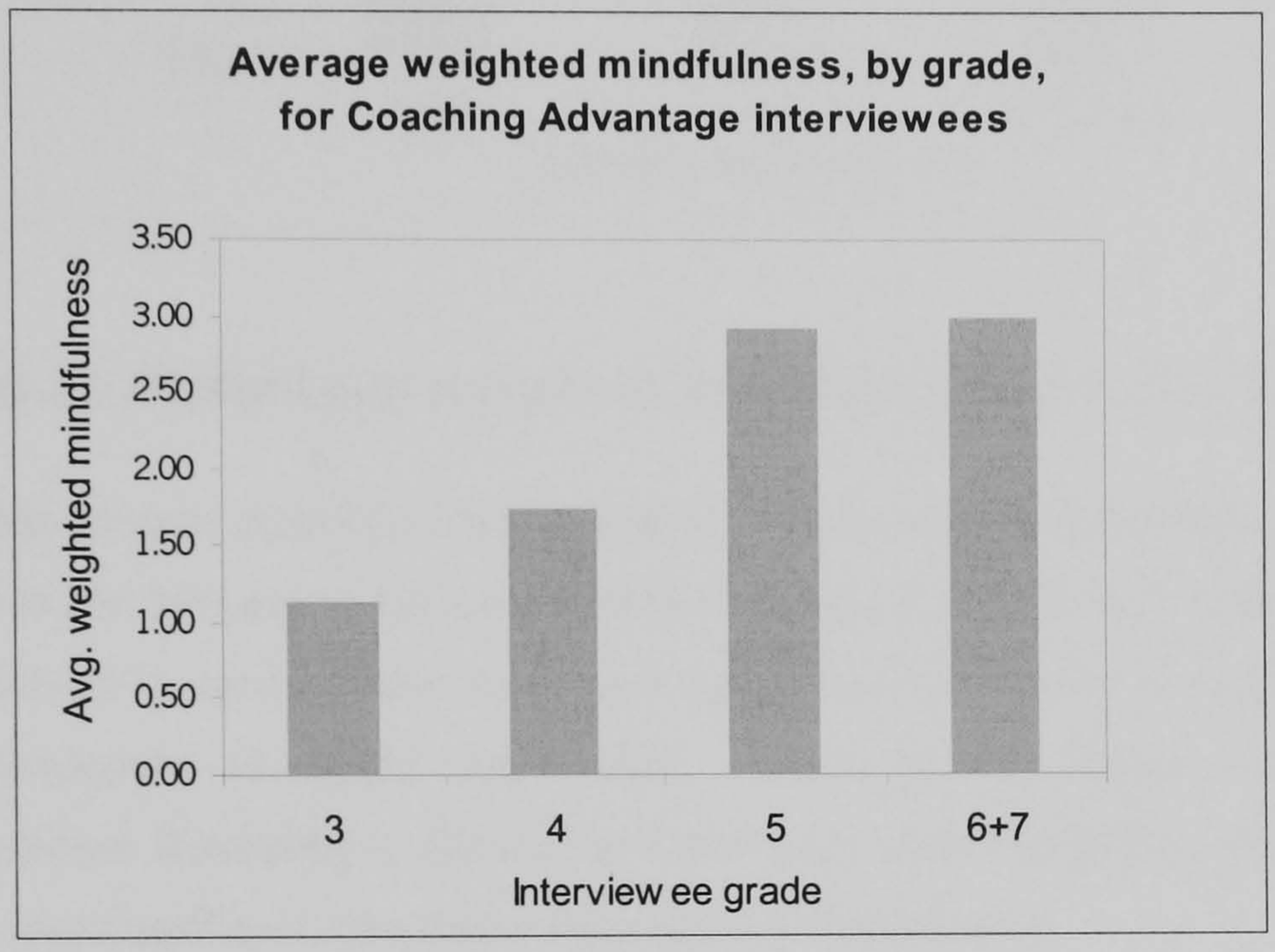
Styles-of-engagement were transformed into numerical weightings on the basis of their position along the two dimensions of 'learner to content interaction' (passive > active), and 'primary orientation' (rapid completion or learning). The numerical weightings indicated interviewees' degree of mindfulness. The weightings were: mindful =4; looking for take-aways = 3; exploring = 2; watching TV = 1; playing the game = 0; going through the motions = 0; getting through it = 0. Another decision to be made was how to categorise each learners' overall style-of-engagement. As previously indicated, it was probable that learners adopted more than one style-of-engagement during the course of completing the activities. To reflect this, each transcript was re-read, specifically to attribute weightings, and an estimate was made of the proportionate split of styles-of-engagement which the interviewee demonstrated. The transformations produced data spreadsheets which are shown in Appendix J.

Analysis of the numerical transformations indicated some interaction between interviewees' mindfulness, outcome, level-of-expertise, and (for study 3) business unit. The interactions are discussed next, supported by several charts derived from the numerical data.

7.7.2 FINDINGS

Mindfulness by level-of-expertise and business unit

In study 2 (*Coaching Advantage*), mindfulness correlated with level-of-expertise. This trend was not apparent in study 3 (*Navigating the Grey*), with the exception that interviewees of the highest level-of-expertise were the most mindful.



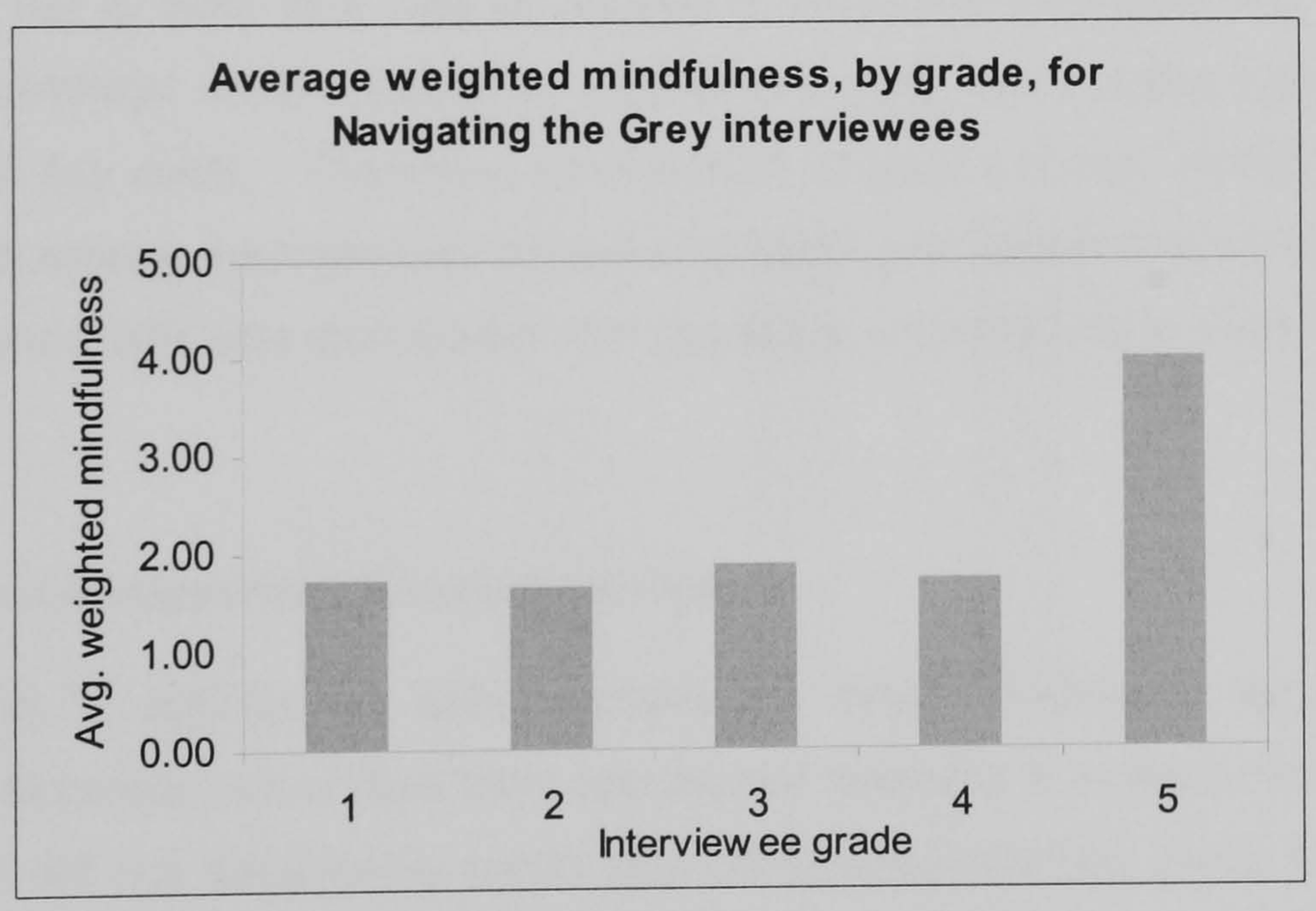


Figure 19: Mindfulness by grade for Coaching Advantage *and* Navigating the Grey *interviewees*

Data from study 3 indicated an interaction between mindfulness and business unit.

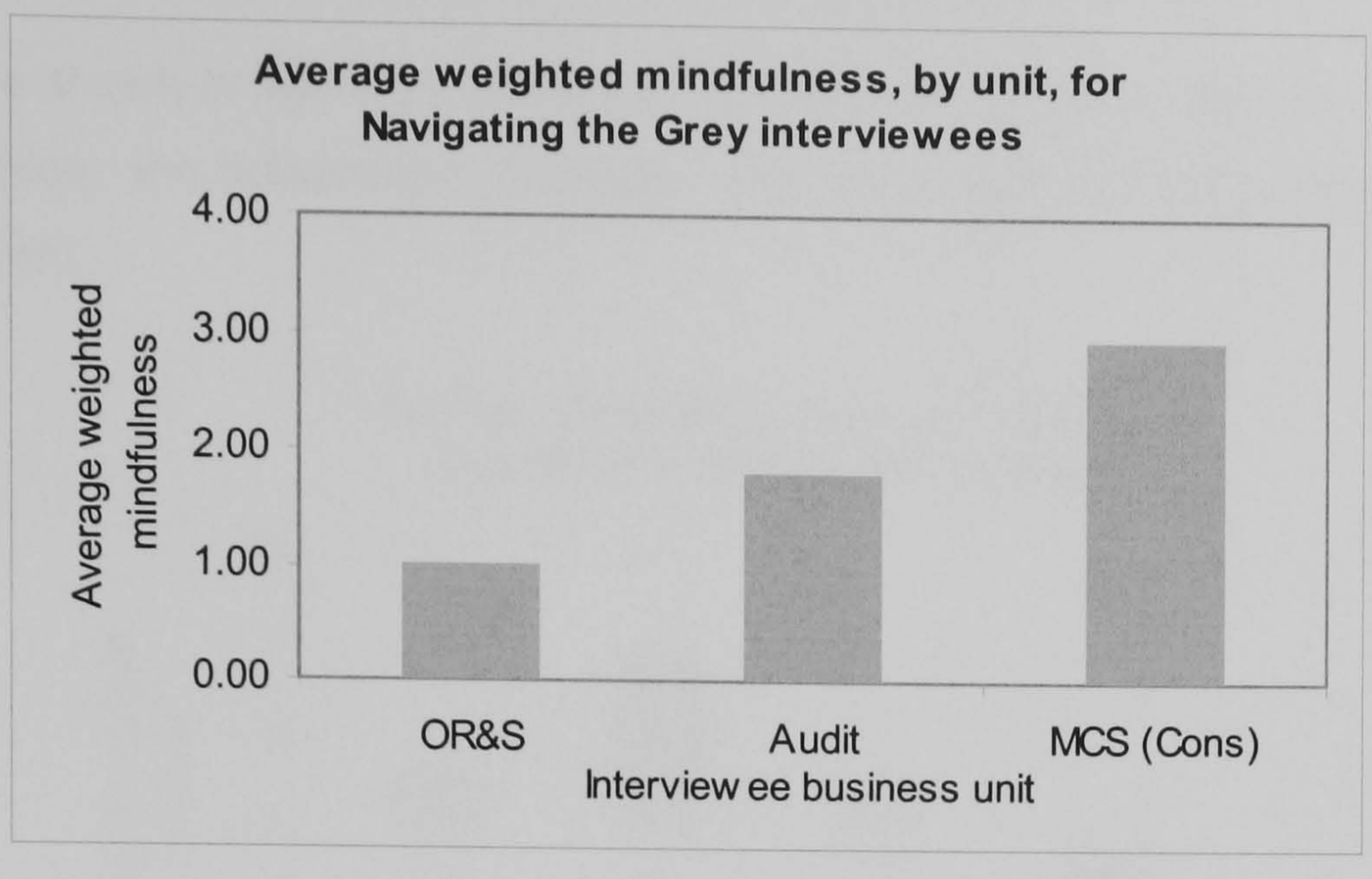


Figure 20: Mindfulness by business unit for Navigating the Grey *interviewees*

The results suggest several possible interpretations. Management consultancy employees tend to engage clients at the highest levels (e.g. board of directors, CEOs and chairman) whilst audit staff are less exposed to senior client staff, and operational research & support staff ('OR&S') have very little exposure to senior client staff. Many of the ethical dilemmas and staff management dilemmas illustrated in *Coaching Advantage* and *Navigating the Grey* would have less relevance to audit staff and little direct relevance to OR&S staff.

Similarly, degree of independence on assignments could have had an impact. Management consultants tend not to work in a very structured or control-based hierarchy, whilst audit staff have a very hierarchical control structure, and OR&S staff rarely make decisions which can negatively impact the client. Therefore, assessment of personal risk ('APR') would generally tend to be highest among management consultancy staff, and lowest with OR&S staff. Findings indicated that higher APR was associated with increased mindfulness in interviewees' styles-of-engagement.

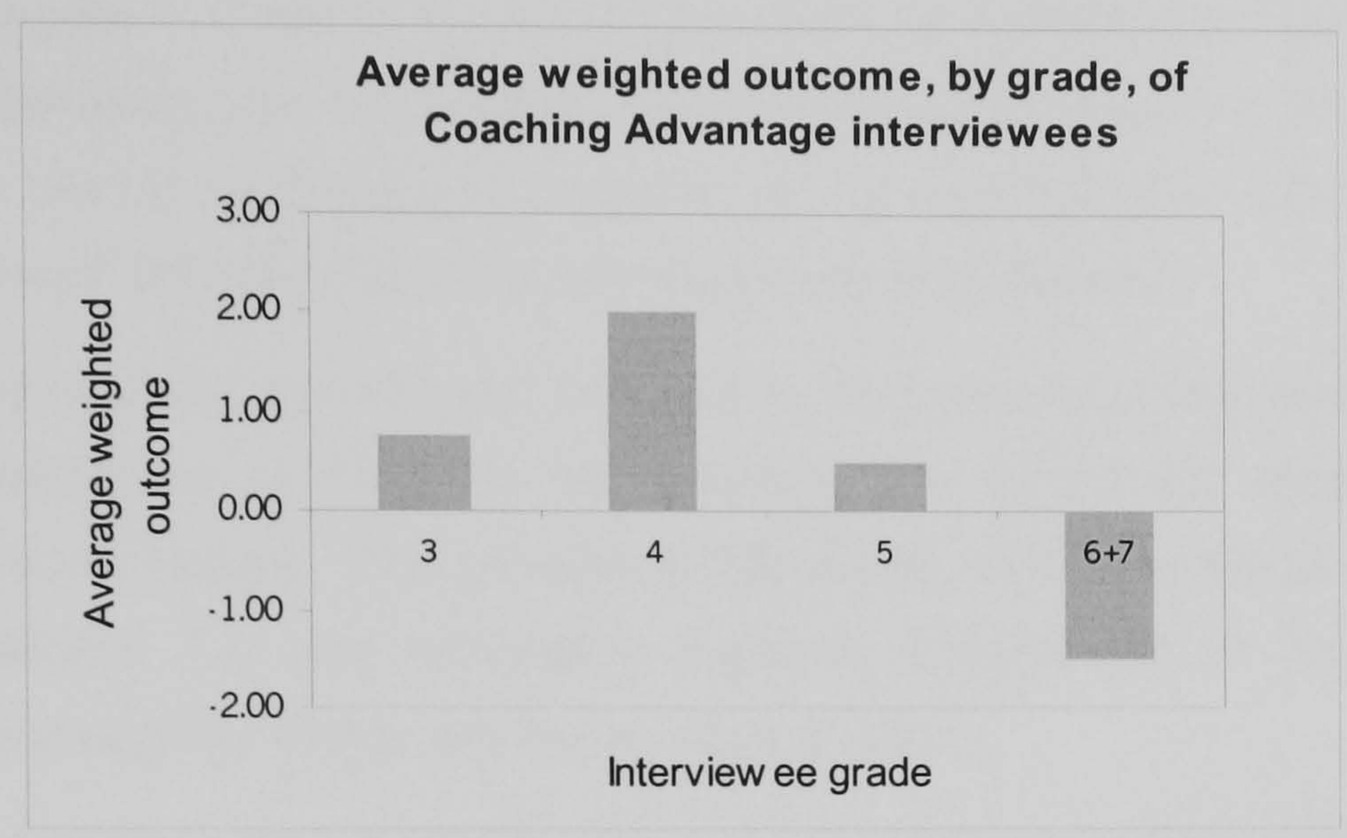
Outcomes by level-of-expertise and business unit

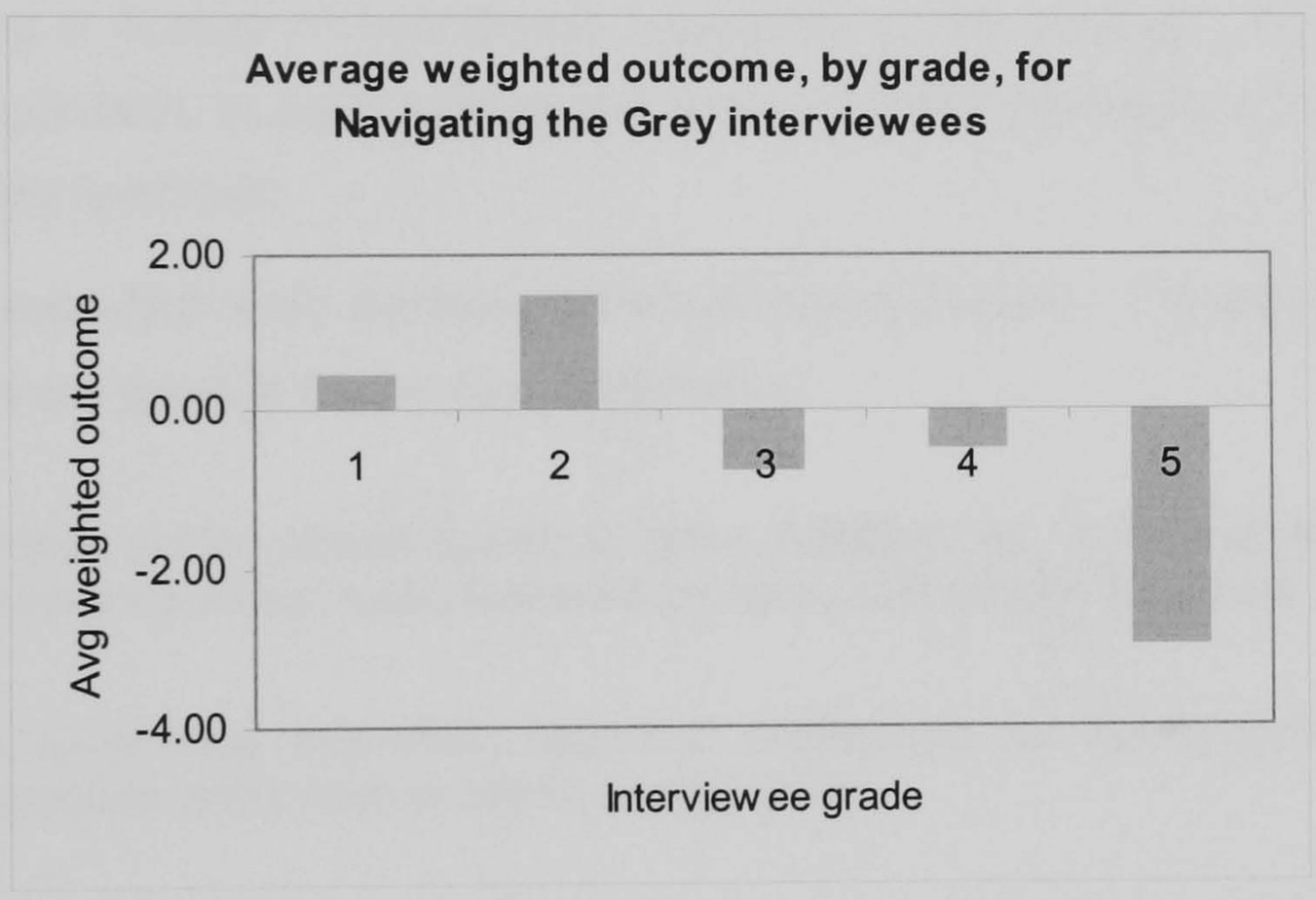
In studies 2 and 3, satisfaction with feedback generally decreased as level-of-expertise increased, or as business unit shifted from operational research & support, to audit, to finally to consulting. This did not necessarily mean that dissatisfied learners were mindlessly 'getting through it'. For example, 'dismissal' was sometimes the outcome of a careful evaluation of the feedback; 'sense of incompleteness' often reflected a mindful sense that more information or alternative perspectives could have been useful; and 'frustration' was sometimes expressed if interviewees had invested considerable effort in the task, only to be disappointed by the inadequacies of the feedback.

As a contra to this overall trend, interviewees at the lowest level-of-expertise tended to be more dissatisfied than those of medium expertise. This was possibly because novices with limited

experience and prior knowledge were most likely to struggle to interpret and understand the messages given in the feedback, in spite of a mindful approach.

These trends are shown in figure 21. However, it is important to note that with a different set of feedback examples, the relationship between satisfaction and level-of-expertise might have been quite different.





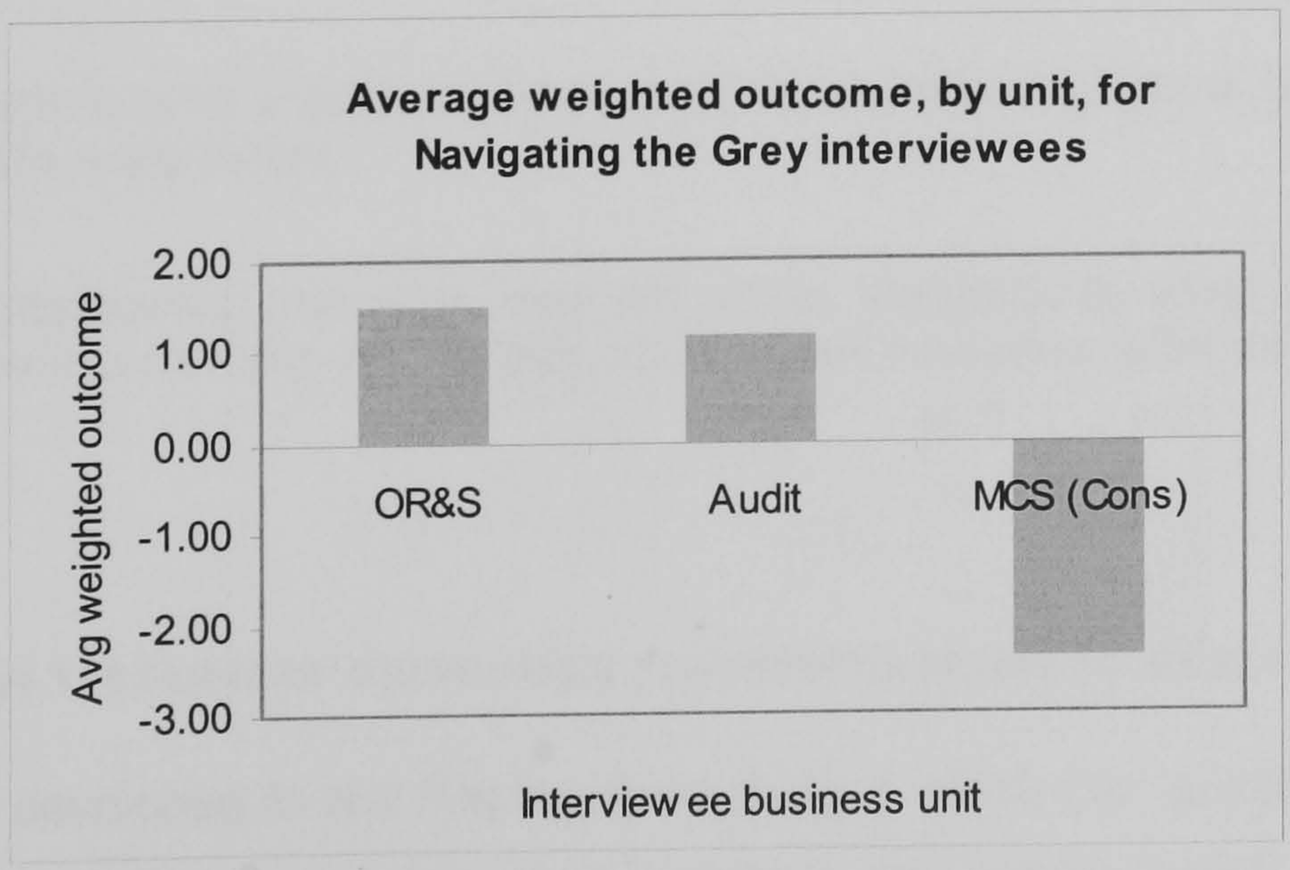


Figure 21: Outcomes by level-of-expertise and business unit for Coaching Advantage *and* Navigating the Grey interviewees

7.8 DEVELOPING PROPOSITIONS FOR FURTHER INVESTIGATION

7.8.1 INTRODUCTION

Learners' expectations of, and responses to feedback were investigated from several perspectives in studies 1, 2 and 3: by exploring learners' recollections of 'real' feedback as well as opinions of alternative, non-verificational feedback designs; by asking for opinions on what makes feedback 'useful'; by probing for reasons behind dissatisfaction with feedback; and by investigating learners' reflections on what was 'missing' from feedback.

Findings indicated that from the learners' perspective, what was important was that their specific and generic expectations of feedback were matched by feedback's elaborative attributes, generating a sense of closure. The conceptual framework representing this matching process was shown in section 7.4, and interactions between components of the framework were discussed in earlier sections of this and the previous chapter.

Towards completion of studies 2 and 3, the decision which presented itself was whether to continue exploring new aspects of learners' responses to feedback, or to consolidate the findings by testing a number of hypotheses suggested by the findings. My decision was to adopt the latter approach, in order to draw out some concrete implications for the instructional design of e-learning feedback.

The five hypotheses which were developed are summarised below. The arguments supporting their development are given in the sections with follow.

H1: Learners prefer closed-question tasks followed by verificational feedback, over open-question tasks followed by non-verificational feedback.

H2: With increasing expertise, learners' preference for feedback's epistemic perspective shifts from dualistic to relativistic.

H3: With increasing expertise, learners prefer feedback which is more conceptual and less concrete.

H4: With decreasing expertise, learners prefer feedback which is more analytic and less experiential.

H5: With decreasing expertise, learners prefer feedback to cover all response options in a multiple-choice task, and not just the option selected.

7.8.2 HYPOTHESIS 1: LEARNERS' PREFERENCE FOR VERIFICATIONAL FEEDBACK

Hypothesis 1 was developed to test findings from study 1 which had questioned assumptions about the utility of activities combining open questions and model-answer feedback. These assumptions, which had influenced decisions regarding the choice of feedback examples from

Zentoria, were as follows: firstly, learners would perceive multiple-choice questions as being too simplistic because the "myth of the right answer" (Schank & Cleary, 1995) does not apply to the complexities of business problem-solving; secondly, learners would find open-question activities challenging and interesting because they give learners the scope to construct their own answers; thirdly, learners would use model-answer feedback to self-evaluate their own response. These assumptions were indirectly supported by the literature on adult learning, which emphasises the self-directed nature of their learning (Rogers, 1996), and by studies by Laurillard at the Open University (1998). They were also supported by my own experience in the training department of the participating organisation.

However, findings from study 1 indicated that without the promise of being 'marked' by the computer, few interviewees actively engaged in constructing a typed essay response, and many received model answers as *new* pieces of instruction, rather than feed*back*.

To investigate this proposition it was proposed that:

H1: Learners prefer closed-question tasks followed by verificational feedback, over open-question tasks followed by non-verificational feedback.

7.8.3 HYPOTHESES 2: LEARNERS' PREFERENCES ALONG THE DUALISTIC:RELATIVISTIC DIMENSION

Findings from studies 1, 2 and 3 indicated that the degree of closure experienced by learners depended not only on the feedback content, but also on the 'fit' between their views on knowledge and learning, and the epistemic perspective implicit in the feedback. In other words, what mattered was both the *content* - the coverage of information provided by the feedback - and *epistemic congruence*.

Two dimensions of feedback's epistemic perspective were identified - dualistic:relativistic and experiential:analytic - and the former was investigated in this hypothesis.

The dualistic:relativistic dimension draws on Perry's (1970) work on the epistemic perspective of college students, and their progression towards relativism as they developed in intellectual and ethical maturity. Perry's categorisation of the immature (dualistic) and mature (relativistic) students resembled differences seen in this research between novices and experts. The dichotomy is supported by prior research. For example, Chi et al., (1981) suggested that when novices make their first inroads into ill-structured subject areas, they tend to seek out simplifying rules-of-thumb and explanations. In addition, in their five-stage model of the development of expertise, Dreyfus and Dreyfus (1986) proposed that novices work with rules and non-situational aspects of problems, whereas experts recognise the importance of situational and contextual factors. However, a complicating variable identified in this research was that if a learners' APR (assessment of personal risk) was high - whether novice or expert - learners tended to prefer dualistic feedback. To examine these apparent differences, it was proposed that

H2: With increasing expertise, learners' preference for feedback's epistemic perspective shifts from dualistic to relativistic.

7.8.4 HYPOTHESIS 3: LEARNERS' PREFERENCES ALONG THE CONCRETE:CONCEPTUAL DIMENSION

Granularity is defined in this thesis as the level of abstraction inherent in the feedback message - whether detailed and concrete, or principled and conceptual. The literature on expertise suggests that when experts consider problems, they think in terms of underlying principles, whereas novices consider only the superficial surface structures of the problem (Chi et. al., 1981). In this research, it was found that experts seemed to perceive the instructional approach to be shallow if feedback dealt only with surface details. To examine this more closely, it was proposed that:

H3: With increasing expertise, learners prefer feedback which is more conceptual and less concrete.

7.8.5 HYPOTHESIS 4: LEARNERS' PREFERENCES ALONG THE EXPERIENTIAL:ANALYTIC DIMENSION

Following on from the discussion regarding Hypothesis 2, the second dimension of feedback's epistemic perspective was experiential:analytic. This dimension draws on Kolb's (1984) work on experiential learning, which he described as a cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation. Findings indicated that novices and experts differed in their ability to learn from experiential or analytic feedback. Although the majority of interviewees welcomed video-rich experiential feedback because it created a sense of theatre and storytelling, many novices seemed to have difficulties abstracting the key learning points from it. The implication of this finding is that novices might prefer analytic over experiential feedback, or at least to have a combination of the two. To investigation this proposition, it was proposed that:

H4: With decreasing expertise, learners prefer feedback which is more analytic and less experiential.

7.8.6 HYPOTHESIS 5: LEARNERS' PREFERENCE FOR RETROSPECTIVE COVERAGE

Retrospective coverage is defined in this thesis as the extent to which feedback refers to *all* response options available with the preceding MCQ, for example explaining why each option is correct or incorrect.

In studies 2 and 3, novices, more so than experts, expressed feelings of confusion after reading the feedback if it did not elaborate on all response options. This dissatisfaction sometimes extended to situations where learners had successfully guessed at the correct response, because correct-response feedback tended to presume that learners already understood *why* the response was correct, and why the alternatives were incorrect.

Variability in learners' knowledge schemata may be one contributing factor explaining differences in their expectations for retrospective coverage. Experts usually have well-structured and relatively stable schemata for their topic of expertise, which enable them to make inferences even with incomplete information (Driscoll, 2000; see also section 2.6.1 of the literature review). When reading feedback which refers only to the response option selected,

they may have sufficient prior knowledge and experience to infer why the alternative responses are incorrect or correct. Novices usually have weaker, less stable schemata containing many gaps and inconsistencies. It is possible that if they receive feedback which lacks retrospective coverage, they may be unable to bridge the knowledge gap and comprehend why the alternative responses are incorrect or correct. It was therefore proposed that:

> H5: With decreasing expertise, learners prefer feedback to cover all response options in a multiple-choice task, and not just the option selected.

7.9 CONCLUDING REMARKS

This chapter built upon the analysis presented in chapter 6 by developing new components of the conceptual framework. In particular, the chapter discussed learners' styles-of-engaging with the feedback, learners' outcomes (sense of closure or non-closure) on receiving feedback, and the way in which the elaborative attributes of feedback influenced those outcomes. Findings indicated that learners' level-of-expertise was a factor which influenced interactions between feedback's elaborative attributes and learners' outcomes. An implication of this finding is that e-learning feedback should be adaptive to learners' level-of-expertise in order to enable learners to achieve closure.

To examine the influence of level-of-expertise more closely, four hypotheses were developed from studies 2 and 3 which could be tested using a new sample of learners. In addition, a 5th hypothesis was developed from findings in study 1 which had indicated learners' preference for verificational feedback. The five hypotheses were tested in study 4. Findings are presented in the next chapter.

CHAPTER EIGHT
ANALYSIS OF STUDY 4

8.1 INTRODUCTION

Studies 1, 2 and 3 explored business learners' expectations of, and responses to e-learning feedback. The experiences of learners contributed to the development of a conceptual framework introduced in previous chapters. It has been argued that learners expect feedback to enable them to achieve a sense of closure by satisfactorily answering the questions raised in their minds by the task, as well as by meeting their expectations from feedback.

Study 4 aimed to investigate the interaction between the elaborative attributes of feedback and learners' sense of closure by testing the five hypotheses proposed in the previous chapter with a new sample of interviewees. For each hypothesis, a specific e-learning activity was presented to interviewees for completion and discussion. An important assumption made in this study was that there would be discernible differences in learners' responses dependent on their level-of-expertise, judged by their ratings of the usefulness of the feedback (using a Likert scale) as well as their outcomes on receiving feedback (interpreted and weighted using similar procedures to those described in section 7.7.1.

Chapter 5 described the sample, interview schedule and contact procedures relevant to study 4, whilst this chapter describes the materials and presents the findings. The majority of this chapter is organised by presenting, for each hypothesis, the rationale for developing the hypothesis, the materials used to test it, and the findings. Appendix H shows screenprints of the activities used to test the five hypotheses. In the analysis of the results for each hypothesis, average interviewee ratings as well as numerical equivalents (i.e. weightings) of interviewees' interpreted outcomes are presented in a table which can be interpreted as follows:

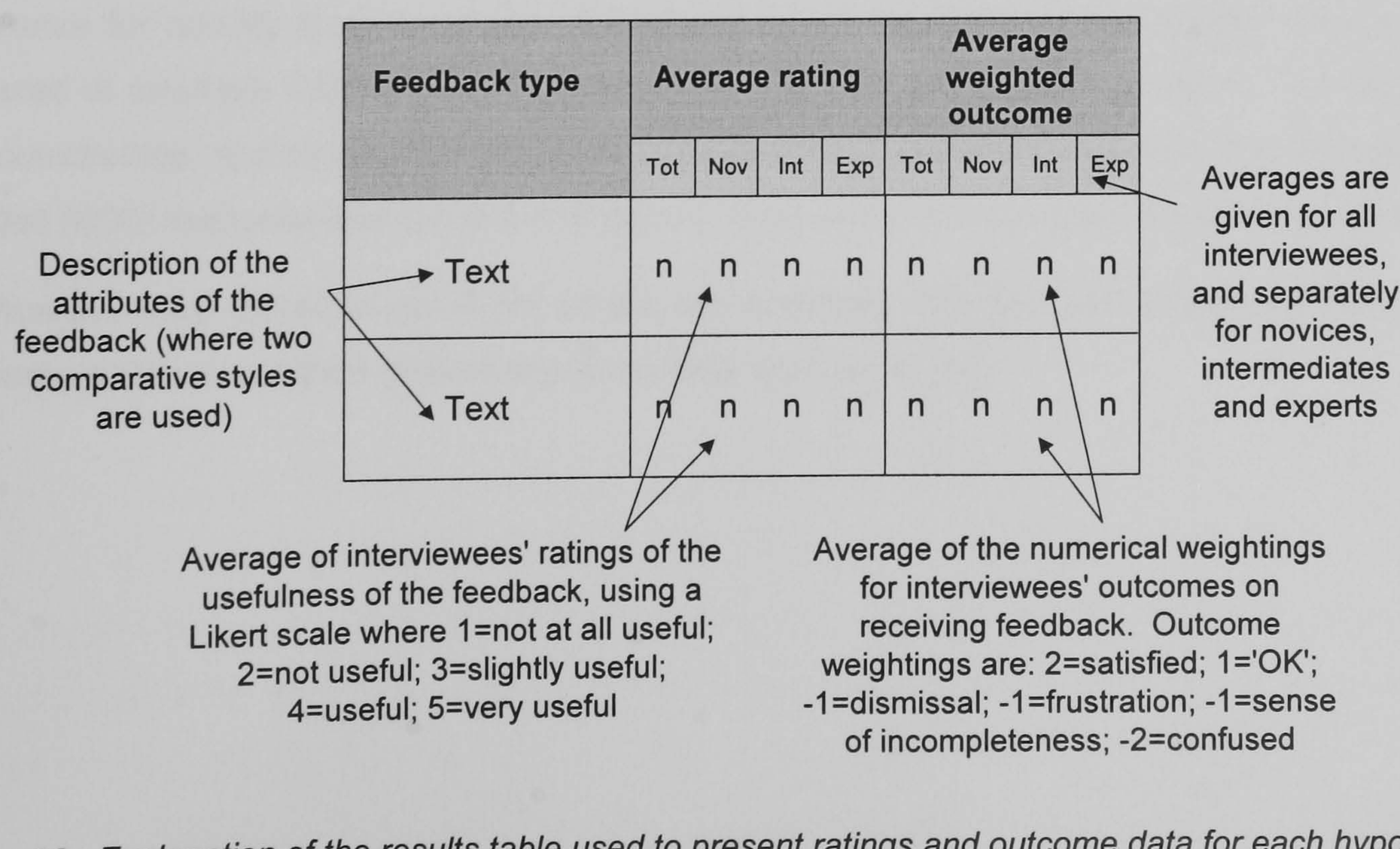


Figure 22: Explanation of the results table used to present ratings and outcome data for each hypothesis

Throughout study 4 many of the discussions about interviewees' preferences were influenced by their perceptions of the credibility of the feedback. Credibility was identified in chapter 7 as a contributory factor towards achieving closure. However, because of the emphasis placed on credibility by many interviewees in study 4, particularly by experts, this chapter concludes with a brief review of the importance of credibility as it pertained to this study.

8.2 H1: LEARNERS' PREFERENCE FOR VERIFICATIONAL FEEDBACK

H1: Learners prefer closed-question tasks followed by verificational feedback, over open-question tasks followed by non-verificational feedback.

8.2.1 RATIONALE

Findings from study 1 called into question two working assumptions: firstly, that learners would find open-question activities challenging and interesting because open questions gave learners the scope to construct their own answers; and secondly, that learners would use model-answer feedback to self-evaluate their own responses. Hypothesis 1 investigated findings from study 1 which indicated that without the promise of being 'marked' by the computer, few interviewees actively engaged in constructing a typed response, and many received model answers as *new* pieces of instruction, rather than feed*back*.

8.2.2 MATERIALS

Hypothesis 1 was tested using activity ZEN1 from *Zentoria*, the e-learning application used in study 1. The activity illustrated the problem of 'scope creep' (an unsanctioned increase in a project's original scope).

Hypothesis 1 was different from the remaining hypotheses in that it included *two* types of task as well as two types of feedback. To test the hypothesis, interviewees were asked to compare an open question with non-verificational feedback (activity type 'a'), and a closed, multiple choice question ('MCQ') with verificational feedback (activity type 'b'), and to indicate their preference for activity type (a) or (b). Feedback (a) presented a model-answer similar to the one used in example ZEN1 from *Zentoria* which was rich in prescriptive detail. Feedback (b) was constructed specifically for study 4. The feedback indicated whether the interviewees' selected MCQ response was correct or incorrect, and contained a précis of the model answer.

Interviewees were asked to comment on the two activities, rate the usefulness of both types of feedback, and indicate their preference for activity type (a) or (b).

8.2.3 FINDINGS REGARDING ACTIVITY TYPE

Hypothesis 1 was supported in that all interviewees expressed a preference in principle for activities combining multiple-choice question ('MCQ') and verificational feedback. The two reasons most frequently given where: firstly, in a closed-question with multiple response options, the task requirements were clear and unambiguous; and secondly, closed-questions offered the promise of verificational feedback.

Clarity of task was important to both novices and experts. Novices wanted clear guidance in how to think about the problem, and felt that this was given by the MCQ more so than the open question.

> "I quite like [the multiple-choice question]. It may only be because I didn't have the background to the question, and because I'm obviously not at the level that this exact exercise would have been aimed at, but I don't think my answer would have been as structured, whereas this at least gives you something to work on ... I wouldn't have known the exact thought paths to go along to come up with these different options, in my head ." [SF3]

> "With multiple-choice, you know what - you sort of get an understanding of what their thinking is, and so you can think "ah, I see what they're getting at" by looking at something. Because sometimes [the open questions] are so open-ended you're not entirely sure what to put in there." [SF7]

Experts also preferred the MCQ because it removed ambiguity about the task requirements. The thought of spending time constructing a response to an open question which the program might not have anticipated (but which was nevertheless valid in the circumstances envisaged by the learner) lead several experts to comment along the lines of "why bother?" By comparison, the MCQ gave reassurance of being "in a finite zone" [SF10]. To avoid what they saw as wasting time, some interviewees said they would dismiss open questions without attempting to answer them, and would move swiftly on to reading the feedback without thinking through the problem posed.

Ironically, several interviewees acknowledged that open questions were 'better' than MCQs from an educational point of view precisely because - in theory at least - they encourage divergent thinking which would probably promote a mindful style-of-engagement.

> "The open question is good because it gets your imagination going, and it gets you to be bothered to think about it, whereas the MCQ is a bit of an easier option really. It's either 1, 2 or 3. ... I personally prefer to be given choices, and then trying to work out which choice I prefer. It's just the way I am. But I can see totally the benefit of making you actually bother to think about it." [SF5]

From an instructional viewpoint, there appeared to be advantages in presenting interviewees with a multiple-choice question: firstly, the range of available response options gave interviewees a clear steer towards the direction of thinking the e-learning designers intended for them; and secondly, within the confines of the set of response options, interviewees spent some time comparing and thinking about the available options. As indicated above with the quotation from SF7, it is possible that the MCQ response options were interpreted as guides to the

'boundaries' of the problem, and so acted as a form of "scaffolding" (Wood, Bruner & Ross, 1976). Scaffolding was likely to be particularly useful for novices and intermediates. The following comment is from a novice; the next, which is more reflective, is from an intermediate.

> "I suppose partly by seeing something in print, you know one of the options might be the right answer, so you've got a bit more confidence, I suppose. It's probably also quicker as well, and by reading through those you sort of see where it's going. It's giving you some suggestions, so you know you're along the right lines." [SF7]

> "I think making people make choices actually means that someone's actually going to look through things. Even if there are three equal answers, people are still going to want to read through them, and make sure they chose the one they think's right. So straightaway it means you've got to engage more with the CBT. ... And [with the MCQ], where you've got a logical choice, it does mean that you have got to make a choice before you go on." [SF11]

The second reason for preferring the MCQ formats was that it promised verificational feedback. Verification was very important to most interviewees, and several indicated outcomes of frustration and sense-of-incompleteness on receiving model-answer feedback. Commenting on the lack of verification given in response to the open question, interviewee SF4 remarked:

> "You're saying that the computer is not able to understand what I'm writing down? Well then I would say 'why should I bother?' [laughter] Because the key thing is, do I actually respond correctly to this email? do I give the right instruction to this guy? ... I would probably not use [the Scratchpad] again as I don't see any value in it. ... It would be, for me, just additional work, and I'd just want to go on." [SF4]

The realisation that the computer would *not* evaluate responses typed into the Scratchpad led most interviewees to revise their expectations of the usefulness of the task and resultant feedback for open questions. They predicted that if presented with more open questions, they probably would not construct a typed response, though they might spend a few moments thinking about the question.

> "It probably would tempt me to not give as much thought to it, not to elaborate as much as I should. Although I know deep down that I'd get more out of it myself if I challenged myself and really took time to structure that answer and plan it, I think that I would be tempted to become a bit flippant with it and just write down a few bullet points for each one, and then proceed, because I'd be more interested in reading the feedback." [SF3]

MCQ formats were not without criticisms, particularly from experts. A key criticism was that if the range of response options were deemed inappropriate or invalid, the whole activity would be tarred with a lack of credibility. The comments from several interviewees indicated that in these circumstances, they might adopt a style-of-engagement akin to 'playing the game'. For example, SF6 complained that MCQs were often simplistic, and that she found it easy to systematically work out the correct response option, because she could guess at the hackneyed 'right/wrong' alternatives which would typically be presented by the e-learning designers.

8.2.4 FINDINGS REGARDING FEEDBACK

Feedback type	Average rating				Average weighted outcome			
	Avg. total	Nov	Int	Exp	Avg. total	Nov	Int	Exp
1a) Non-verificational, prescriptive model answer	3.4	3.6	3.7	3	0.8	1.8	0.7	-0.5
1b) Verificational & mainly prescriptive	3.1	3.3	3.5	2.5	-0.3	0	0	-1

Table 23: Results table for hypothesis 1

The table above shows that the model answer feedback (i.e. 1a) generated higher ratings and outcomes from most interviewees. At first reading, this seems to contradict the stated preference, in principle, expressed by all study 4 interviewees for activity types which combined closed-questions and verificational feedback. The reason for this discrepancy appears to relate to criticisms of the specific elaborative attributes in feedback (1b). The elaborative attributes pertain to the 'content' of the feedback rather than its verificational component. It was argued in the previous chapter that the four attributes of feedback which were particularly important to interviewees were:

- Instructional function
- Epistemic perspective (along two dimensions of dualistic:relativistic and experiential:analytic)
- Content (granularity; coverage of issues, process and conditionality; and retrospective coverage)
- Contextualisation

The two primary criticisms levied against the verificational feedback (i.e. 1b) were firstly that its instructional function was inappropriate, and secondly that its content was not as rich as that provided in the model answer.

Regarding the first criticism, some interviewees indicated that in response to a closed question such as a MCQ, feedback which fulfilled an instructional function of 'stating correct behaviour' was insufficient. Many interviewees commented that they wanted more explanation as to why each of the available response options (including those which were not selected) were either correct or incorrect; in other words, they wanted retrospective coverage. Several interviewees indicated that if feedback (1b) were explanatory and included richer content, they would have rated it more highly.

Regarding the second criticism, several interviewees indicated that the content provided by the verificational feedback was less comprehensive than that provided in the model-answer.

In addition to this comparative comment, several criticisms were made which related to *both* feedback styles, and which indicated that both styles had generated outcomes of 'frustration' or

'sense-of-incompleteness'. The principle criticism was that both feedback styles implied there was a single correct solution to the problem of scope creep, and lacked a sense of the 'conditionality' of the problem. Conditionality was discussed in the previous chapter and was identified as important following several interviewees' comments that they wanted feedback to include more discussion about what-if scenarios. In this study, conditionality was important for both novices and experts. However, several novices, whilst recognising the legitimacy of different ways of handling the problem, still sought the security of the 'best practice' answer.

> "What would be useful would be different ways of dealing with the situation. Possibly a few different answers as opposed to "you should do this", and then obviously if there's a specific way that they reckon good project managers would do it, then highlight that, but give examples of other possible scenarios and their outcomes." [SF5]

Several experts also remarked that they wanted better feedback on the general principles and underlying issues.

> "It's sensible. But it falls short of being 'living'. ... Looking behind the issues. Looking behind at the people. How are we going to influence people? How is the relationship with the people going to carry on working?" [SF10]

8.2.5 IMPLICATIONS

Findings relating to Hypothesis 1 showed that, in principle, interviewees preferred activity types which combined MCQs and verificational feedback. For most interviewees, their sense of inquiry was high when engaging with MCQs because they believed that their response would be verified, which generated a sense of challenge. For novices, an additional benefit was that the range of available MCQ response options helped them understand the parameters of a feasible solution to the task. However, several interviewees recognised that the theoretical benefit of an open question is that it prompts mindful, divergent thinking. An implication from this finding is that activities which combine (1) an open question+model answer with (2) a closed question+verificational feedback, may increase learners' mindfulness as well as their sense of challenge: the open question would promote divergent thinking, whilst the closed question would provide an expectation of convergent, verificational feedback. Figure 23 proposes a structure for such an activity.

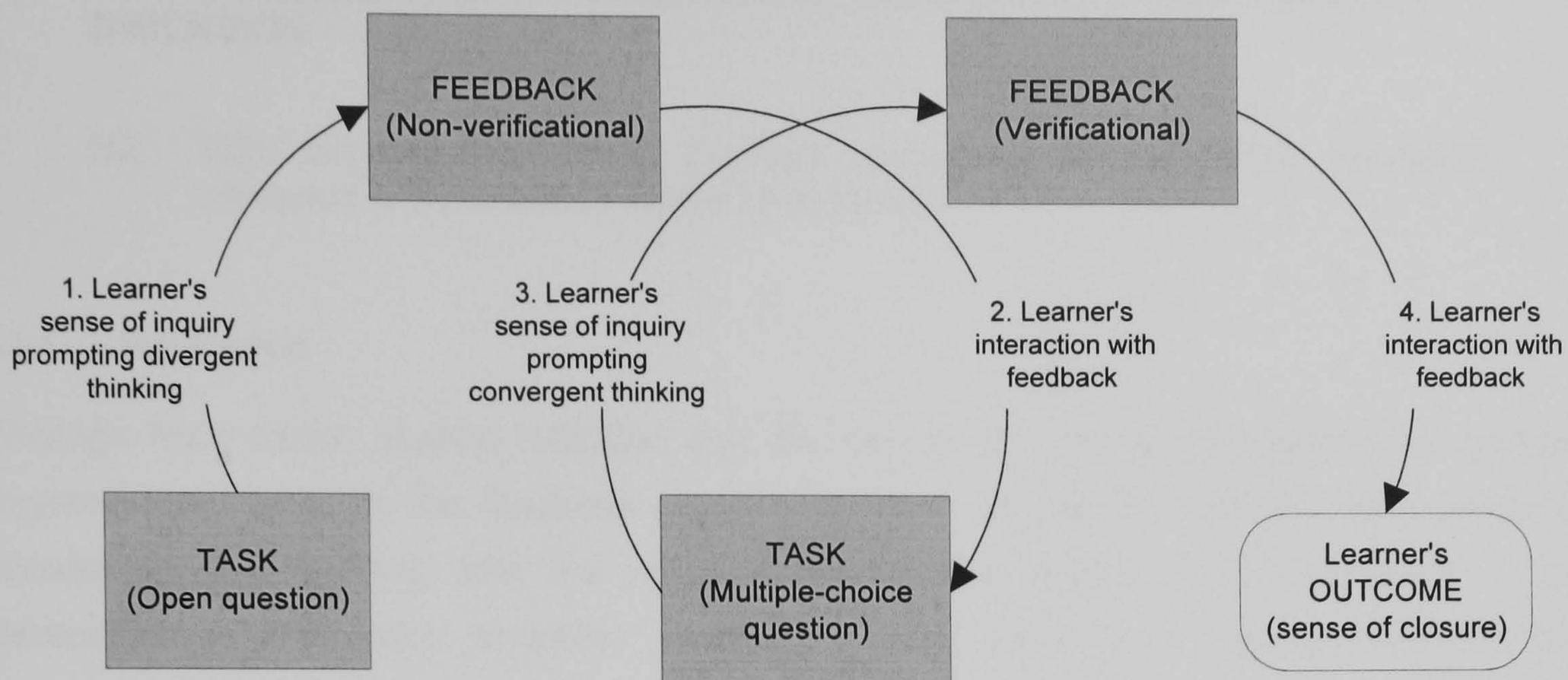


Figure 23: Proposed structure for divergent:convergent activity

Findings also indicated that verificational feedback was not necessarily sufficient to promote learners' satisfaction on receiving feedback, unless the elaborative attributes of feedback also matched learners' expectations. The implication from this finding is that the elaborative attributes must be adaptive to learners' expectations if learners are to achieve closure on receiving feedback.

8.3 H2: LEARNERS' PREFERENCES ALONG THE DUALISTIC:RELATIVISTIC DIMENSION

H2: With increasing expertise, learners' preference for feedback's epistemic perspective shifts from dualistic to relativistic.

8.3.1 RATIONALE

Findings from earlier studies indicated that the degree of closure experienced by learners depended not only on the feedback content, but also on the 'fit' between their views on knowledge and learning, and the epistemic perspective implicit in the feedback. Two dimensions of feedback's epistemic perspective were identified - dualistic:relativistic and experiential:analytic - and the former was investigated in this hypothesis.

The dualistic:relativistic dimension draws on Perry's (1970) study of students' progression from a dualistic perspective (which presumes there is a correct answer to all questions of knowledge) towards a relativistic perspective (which accepts the possibility of multiple perspectives justified by different systems of values or logic). The dualistic:relativistic dimension was introduced in section 7.4.2. Perry's categorisation of the dualistic and relativistic students resembled differences seen in this research between novices and experts. However, a complicating variable identified in earlier studies was that if a learners' APR (assessment of personal risk) was high - whether novice or expert - learners tended to prefer dualistic feedback.

8.3.2 MATERIALS

This hypothesis was tested using an activity from *Navigating the Grey*. The activity was one in which the client offered a member of the consulting team tickets to an important baseball game. Interviewees were asked to respond to a multiple-choice question. Two styles of feedback were then given. Feedback (2a) was non-verificational, and provided text and still photographs of three commentators (wife, colleague and ethics helpline advisor) each giving their perspective on how to resolve the problem. Feedback (2b) was verificational and adapted to the response option selected by the interviewee. The feedback contained an explanation and a description of the consequences of the selected response option; it was dualistic in its implication that there was only one solution intended for the problem.

8.3.3 FINDINGS

Feedback type	Average rating				Average weighted outcome			
	Avg. total	Nov	Int	Exp	Avg. total	Nov	Int	Exp
2a) Non-verificational & relativistic	2.8	2.4	3.7	3.1	-0.2	-0.9	0	0.5
2b) Verificational & dualistic	3.6	4.2	2.7	3	1	2	0	0.5

Table 24: Results table for hypothesis 2

This proposition was partially supported: all five novices preferred the dualistic feedback; all three intermediates and two experts preferred the relativistic feedback; one expert gave no preference; and one expert preferred the dualistic feedback. However, the topic for this example dealt with ethical issues which generated a high assessment of personal risk for many individuals. The expert who gave a preference for dualistic feedback indicated that she did so because of the importance of establishing a firm-wide policy on such issues.

> "I think for business ethics, something like this - it's important... In a classroom where people have a discussion, the facilitator needs to round it up and say 'fine, that's the discussion, but the [firm's] principle on the code of business is [e.g.] that you can accept lunches up to £5, you can accept this, you have to declare this, you have to check with a partner on this'. There has to be a firm-wide policy." [SF6]

When analysing the reasons for interviewees' responses to the feedback, it became apparent that interviewees' expectations could be mapped along two dimensions: their position along the dualistic:relativistic dimension; and their position along a dimension which Lockwood (1992) called the "deference:confidence continuum". These aspects share a central concern with the nature and source of knowledge, and are discussed next.

The **dualistic:relativistic dimension** differentiates between a dualistic perspective, which assumes there is a correct answer to all questions of knowledge, and a relativistic perspective, which accepts the possibility of multiple perspectives justified by different systems of values of logic. Perry (1970, 1981) found that very few American freshmen began college life in what he classified as "Position 1", which represented a pure, naïve dualism. Similarly, in this study, there were few indications of a naïvely dualistic response to the feedback. Novices as well as experts acknowledged that for complex problems, there were usually several ways to view the dilemma and its solution. Nevertheless, most of the novices seemed to be searching for a sanctioned solution which was 'more equal than others'. Their comments differed from those of experts who seemed more sincere in their acknowledgement of the importance and relevance of different perspectives and different solutions to a problem. One novice commented:

> "I think this [Example 2a - relativistic feedback] does very well to give you a few different perspectives. The perspective I would really like to know about is what the partner would actually say. As useful as these views are, and obviously it helps the thinking process, I'd like a definitive answer at the end of the day." [SF3]

In general, novices seemed less critical than experts of the opinions expressed in the multiple-perspectives feedback. An exception was SF2, whose comments suggested that she represented Perry's position of "multiplicity", which is a position between dualism and relativism where 'anything goes'.

> "These are just opinions, and why are those opinions better than mine? Where is the rule that says that my opinion is not sound? ... A number of examples only tell you what the options are, but not what the best one is. So knowing all the options is nice, but training should help you recognise the best possible [option] for a given situation. And that's what you want to learn, because you can come up with the different options yourself, and you don't need others to tell you." [SF2]

Findings indicated that several experts adopted a *relativistic* position to the problem, with its associated understanding of the importance of context when evaluating ethical and other complex problems. In the following example, interviewee SF10 described his thoughts on the multiple-perspectives feedback.

> "Quite good, quite good, because it's actually about people, and it's recognising that this isn't an easy question. ... I think it would be wrong to define the 'right answer'. I think it would make people feel that training was trivial and mechanistic, and it would frustrate me because I'd want to say "hang on a bit, it's not as simple as that, and these are all the other considerations I'd wish to bring into the [equation]." [SF10]

However, two of the experts commented that although they generally preferred relativistic feedback it was not appropriate in areas where legal and compliance issues (as they saw them) substantially increased their level of APR. A quotation from interviewee SF6 was given above; the second expert, SF1, commented:

> "In the context of this CBT, I don't think it's appropriate. Because this is about ethical behaviour; it's about how one behaves. It's fine to get this as an intermediate piece of feedback, but thereafter there should be the firm's guidelines because this is a very important issue particularly for firms like [name] ... I would personally like to see the cameos, and then the right answer at the end - or the firm's view. Well, it's not 'the right answer', it's just the way the firm would view it." [SF1]

Interviewee SF1 also acknowledged that the multiple-perspectives feedback allowed him to understand the standpoint of those people he might have to influence. However, he also criticised the design of the feedback: it presented *opinions* but did not support them with arguments which advocated the validity of those opinions.

Comments from some interviewees suggested another facet of interviewees' epistemic preferences: their position along what Lockwood (1992) has called the **"deference:confidence"** dimension, which parallels the differences in attitudes to "authority" observed by Perry in dualistic and relativistic students. This dimension was defined in section 7.5.1.

In this study, experts usually showed a confidence in their own judgement as they evaluated feedback content. Many novices exhibited a deference to an external authority. For example, SF5 commented that she believed that senior members of the organisation would have thoroughly vetted the e-learning material, and that it accurately represented the collective and consolidated wisdom of the firm. She continued:

> "... in a CBT you can just as easily say *'I don't agree, that's rubbish*', but you're less likely to, I think, compared to if you're in a discussion group [because your assumption is that the e-learning is] approved by your company, and that's how your company expects you to act, I guess. That's the way you'd look at it." [SF5]

However, several novices attempted to critique the feedback, and seemed to wish to be *seen* as independent thinkers. But when asked how they would evaluate the feedback, many were uncertain what criteria they would use. Their comments suggested they were vacillating between what Belenky et al. (1997) called *received* and *subjective* ways of knowing. One novice explained how she relied on subjective ways of knowing until the point when she learned (i.e. received) new principles with which to guide her behaviour.

> "[I would judge the multiple-perspectives] against my own principles - and that's a funny thing. I think we all have our own principles, somewhere, and unless you go through a learning process in which you learn that there are some other principles you can apply for a particular context, you will be judging all those people's opinions against your own, and not against any other one, because you don't have a point of reference." [SF2]

In the above quotation, SF2 also illustrated her strong sense of "self-ascribed epistemic authority" (Ellis & Kruglanski, 1992), which set her apart from the other novices. Most novices lacked the self-assurance which was evident with experienced interviewees. They seemed to be aware of their lack of experience, and deferred to those in authority. Interviewee SF3 expressed the tentativeness of a new member of an organisation who believed she must work to discern the values and norms of behaviours of her workplace community before being accepted within it.

> "It may just be because I've only just started in the company, and I actually haven't had time to work out 'firm' policy if you like on everything. Because I'm at a stage in my career when I haven't got that sort of knowledge from working before, so I'd actually appreciate some guidance on issues like this where I would be uncertain as to what would be appropriate so for me. ... It would make me feel more secure about the choices that I take." [SF3]

8.3.4 IMPLICATIONS

Findings indicated a shift from preferring dualistic to preferring relativistic feedback as level-of-expertise increased. An implication from this finding is that to enable learners to achieve a sense of closure, feedback's dualistic:relativistic perspective needs to be adaptive to the level-of-expertise of the learners who will receive it. This implication is not a universal principle, however. For example, where learners are likely to experience high APR, feedback needs to err on the side of dualism.

8.4 H3: LEARNERS' PREFERENCES ALONG THE CONCRETE:CONCEPTUAL DIMENSION

H3: With increasing expertise, learners prefer feedback which is more conceptual and less concrete.

8.4.1 RATIONALE

Granularity is defined in this thesis as the level of abstraction inherent in the feedback message - whether detailed and concrete, or principled and conceptual. Hypothesis 3 was develop to test the proposition that novices tend to consider problems in terms of their surface structure, and prefer concrete feedback, whilst experts tend to consider problems in terms of the underlying principles, and prefer conceptual feedback. This proposition was supported by earlier findings, and by the prior research on differences in the way novices and experts represent problems (Chi et. al., 1981).

8.4.2 MATERIALS

This hypothesis was tested using an activity designed by two experienced project managers from the participating organisation. The activity related to the first (i.e. 'kick-off') meeting called by a project manager to introduce team members to each other and to describe the projects' goals and objectives. Interviewees were asked to respond to an open question which asked them to consider the questions their team members might ask, and to identify five key points they would present at the meeting. Interviewees were then presented with two styles of non-adaptive feedback: feedback (3a) provided a concrete, detailed checklists of items; and feedback (3b) provided a conceptual aide-memoire.

8.4.3 FINDINGS

Feedback type	Average rating				Average weighted outcome			
	Avg. total	Nov	Int	Exp	Avg. total	Nov	Int	Exp
3a) Non-verificational & concrete	4.0	3.9	4	4	1.4	0.8[22]	1.7	2
3b) Non-verificational & conceptual	3.4	3.6	3.3	3.3	1.2	1.4	0.7	1.3

Table 25: Results table for hypothesis 3

[22] The 'average rating' and 'average weighted outcome' scales are not equivalents; therefore occasionally, as in the novice responses to this activity, the average rating and outcome imply different preferences, due to the effect of averaging across individual ratings and outcomes.

This proposition was not supported. Three novices, two intermediates and three experts preferred the concrete feedback (the detailed checklist); two novices and one intermediate preferred the conceptual aide-memoire; one expert indicated no preference.

Comments from interviewees indicated that whilst novices preferred the checklist, as predicted, so did the experts although for apparently different reasons. Findings indicated that the novices with under six months' experience with the organisation welcomed the prescriptive detail of the checklist because it told them precisely how to behave. Their response to the checklist feedback seemed to be one of clutching at every detail even if not fully understood.

> "This may be because I don't have enough background knowledge about being a project manager, so I quite like having a bit more information, whereas I can understand if people were at the stage where they were ready to manage a team, they'd probably prefer the bullet points because they'd already have sort of the background. I can understand people saying they didn't want anything too prescriptive, especially if there were already at the level where they would know most of this. But for my level I actually like having the detail there." [SF3]

Novices with one or two years' of experience at the organisation rejected the checklist, apparently because of its prescriptive detail. They seemed to be projecting themselves into the shoes of the project manager, and from that position, dismissed the checklist for its burdensome detail. Their stance seemed to be that, "surely a project manager would know how to elaborate on the aide memoire's bulleted list?" When evaluating the validity of the content, however, criticisms from these interviewees focused on concrete details rather than the bigger 'conceptual' picture.

> "[reading from checklist], *'agree dates for team members to be introduced to the client'* - well, the team members are usually already on the client site, working alongside them. There would usually be a brief introduction, like you'd walk the team round, and say *'this is such-and-such, this is such-and-such'*. I don't think you'd go and 'agree dates' for that to happen." [SF7]

What was surprising was that experts did *not* find the checklist prescriptive or frustrating; instead, they seemed to welcome its concrete level of detail. The critical difference seemed to be that experts, with their well-developed mental model of the topic, felt *engaged* with the richly-descriptive and action-oriented narrative of the checklist in a way which they were not with the aide-memoire.

> "[The checklist] is more verbose, but actually it works better. It works better. ... [the checklist] gives me more, more understanding of what I would actually do. [Reading from the planning aid] *'Quality control procedures'* - is, well, yes it's alright. [Reading from the checklist *'Discuss procedures for resolving difficulties during project engagement'*] Ah, this is about how we are going to resolve difficulties. That gives me an understanding of what it will *feel* like - I might get a difficult question from the team and then we will discuss it, rather than, I will sit there and program them all with routines. ... [The checklist] taps into something I can do. It also gives me more of a feeling about what that kick-off meeting would actually be like, whereas with [the aid], I might as well send them a memo." [SF10]

The checklist was about 'doing'; it contained action-oriented words. These seemed to trigger memories of past kick-off meetings, and evoke feelings of 'being there' which may have awoken yet more mental associations. It is possible that by triggering memories of experiences which

could then be compared with the checklist feedback, experts were prompted to validate their own 'mental' checklists.

The aide-memoire was disliked by all of the experts and some intermediates. Many perceived it as bland and lifeless, and its brevity seemed to create its own problems. Comments indicated that the aide-memoire was perceived as confusing and frustrating because the conceptual phrases triggered *so many* possible interpretations as to make them meaningless.

> **"SF4**
>
> These [items on the checklist] are specific tasks. ... you understand what kind of issues are implied by it. With [the aide-memoire], *'specialist advisors'*, I have no clue what that means. So this doesn't help much.
>
> **Interviewer**
>
> It's also mentioned here, in the checklist.
>
> **SF4**
>
> Yes, but [in the checklist] it said *'distribute a profile of the specialist advisors'*. Here [in the aide-memoire], you know, what does *'specialist advisors'* mean? Do we need to resource someone? Do we need to have someone, or do you need to allocate it within the team? It doesn't say anything."

A critical factor in experts' responses to the checklist, which may explain why the hypothesis was not supported, was that all experts saw the checklist as a tool, and not as a piece of feedback which verified their own "5 things to mention", which was requested by the task. They welcomed the checklist as something they could print off, amend and update each time they were about to lead a project kick-off meeting. Interpreted as a tool, experts found the feedback to be *suggestive*, not didactic, and welcomed the action-oriented, descriptive detail.

8.4.4 IMPLICATIONS

Findings relating to Hypothesis 3 were not supported, and at first reading seem to contradict the findings from earlier studies reported in this thesis. An implication from these apparently contradictory findings is that whilst experts may think and reason conceptually, they do not necessarily want conceptual feedback in all circumstances. Concrete details may be preferred on some occasions because they evoke associated memories of similar experiences which experts can then use to reason by analogy. Support for this possibility is given by research from Dreyfus and Dreyfus (1986) on the development of expertise. They argued that "there is more to intelligence than calculative rationality" (Ibid: 36), and that as skills develop from 'competent' (stage 3) to 'expert' (stage 5), problem-solving becomes *less abstract* and analytical and *more concrete* and intuitive (Dreyfus, 1982: 136).

8.5 H4: LEARNERS' PREFERENCES ALONG THE ANALYTIC:EXPERIENTIAL DIMENSION

H4: With *de*creasing expertise, learners prefer feedback which is more analytic and less experiential.

8.5.1 RATIONALE

Hypothesis 4 investigated the proposition that novices would prefer analytic feedback (represented as a text debrief of the main issues) over experiential feedback (represented as a video of the problem intervention and likely consequences of that intervention). Hypothesis 4 was developed because findings from studies 2 and 3 indicated that novices had difficulties learning from experiential feedback. The hypothesis was also supported by the theoretical literature on the processes of experiential learning. For example, Kolb (1984) proposed that experiential learning requires many iterations between experience, reflection, abstraction and more experimentation. A basic premise is that reflection on multiple experiences of handling a problem reveals analogies and parallels, and enables learners to infer the underlying structure of the problem. However, reflection on a single experience does not permit such inductive reasoning.

8.5.2 MATERIALS

This hypothesis was tested using an activity from *Navigating the Grey*. The activity related to a complaint made by a member of staff about an email which she found racially offensive. Interviewees were asked to respond to a closed question. Two styles of feedback were then presented, each of which emphasised different ends of the analytic:experiential dimension.

8.5.3 FINDINGS

Feedback type	Average rating				Average weighted outcome			
	Avg. total	Nov	Int	Exp	Avg. total	Nov	Int	Exp
4a) Verificational & experiential	2.4	2.3	2.2	2.8	-0.8	-1.4	-0.3	-0.5
4b) Verificational & analytic	3	3.6	2.3	2.8	0.1	0.8	-0.3	-0.5

Table 26: Results table for hypothesis 4

This hypothesis was partially supported. All five novices preferred the analytic feedback to the experiential feedback; of the intermediates, one preferred the experiential feedback, one preferred the analytic feedback, and one gave equal ratings to the two feedback styles; of the experts, one preferred the experiential feedback, two preferred the analytic feedback, and one gave equal ratings to two feedback styles.

Findings relating to the experiential feedback ('4a')

Many interviewees of all levels-of-expertise felt there was something 'missing' from the experiential feedback: novices tended to want more didactic instruction; experts wanted more experiential examples or a more discursive form of feedback which presented the arguments for different types of intervention. These differences are discussed in the following paragraphs.

Only one novice *on principle* dismissed the concept of experiential feedback because it could not explicitly present "rules" to guide her future behaviour.

> "That's nice to know - that that can possibly happen - but it's nicer to know the rule, like 'when you have a problem with someone, it's better to talk to that person, because you [can] make things clear and possibly - whatever'. So you know that in that particular situation, the rule is this. And this rule also applies to any situation in which that could happen. ...I think it's very important [to have the rule]. Otherwise, you only have opinions about what could have happened, but not a rule you can think of next time." [SF2]

Most of the other novices liked the idea in theory of using video to portray the likely consequences of a selected response option; however, on watching the video feedback they seemed unsure what they should have inferred from it.

> "I would definitely want to see the video clips of the other options ... because otherwise, this [video] doesn't really make sense to me. It's nice, but I'm not sure I've understood it the way I'm supposed to." [SF5]

When evaluating the video *content*, most novices made statements which suggested that they had not understood the significant issues surrounding the problem presented. Few of the novices seemed to reflect on the lessons which could be learned from the video feedback. In contrast, interviewee SF11, an intermediate, adopted a reflective perspective: although he was initially doubtful that the problem intervention would produce the consequences portrayed, his response was more open-minded than that of some of the novices.

> "I'd think, 'yes, it might happen'. It does make you think. It won't necessarily make you change your answer, but it does mean that you might think things through a little bit more if you're in that situation." [SF11]

All five novices preferred feedback 4b, which gave a text-based analysis of the key points and issues to be considered for the racial harassment problem. What seemed to be important was the clarity and certainty which the feedback portrayed. Some interviewees commented that the ideal would be a combination of both the experiential and analytic feedback. The following quotation is from an intermediate.

> "[The text feedback] is more objective, whereas the [video-consequence feedback] was just a route. I'd say I'd prefer to have that as well, because it puts your mind a little bit more at rest, saying 'that was a possible channel, but on the other hand, these are things you should be thinking about'." [SF11]

From an instructional-design perspective, these findings indicate the potential difficulties faced by novices who are expected to learn from vicarious experiences such as those portrayed in scenario-based activities, games or simulations. Novices are likely to have insufficient experience to draw on in order to make generalisable inductive inferences, and are exposed to

the risk of misinterpreting the experiential feedback. Misperception of feedback is a phenomenon which has also received attention in the systems dynamics literature. Research has indicated that reliance on experiential learning is inefficient and sometimes ineffective unless supported by coaching processes which help learners to identify the key invariants of their experiences (Gentry, 1990; Howie et. al., 2000).

Another possible explanation for the findings is that novices may tend to have a low sense of what Ellis and Kruglanski (1992) called "self ascribed epistemic authority" ('SAEA'), and which they defined as a person's "beliefs about their own expertise or knowledgeability in a domain" (Ibid., p357). In their research, Ellis and Kruglanski found that learners with low SAEA performed less well following experiential instruction that learners with high SAEA. They reasoned that to be capable of learning from experience, a person needs to feel confident in their ability to *interpret* that experience, and that without such confidence, the potential for learning would be limited. Ellis and Kruglanski's findings are relevant to this research, because although SAEA does not necessarily correlate with level-of-expertise, novices are likely to be cautious about claiming to be epistemic 'authorities'.

Several experts were critical of the experiential feedback and of the activity as a whole, but for different reasons than those given by novices. A theme underlying many criticisms was a perceived lack of credibility. Credibility was lost at three points: the task; portrayal of the intervention (i.e. the intended solution); and portrayal of the consequences of that intervention. These three points are discussed next.

Task. For some experts, the task lacked credibility because none of the available response options represented their preferred way of handling the problem, or because they would have resolved the problem by combining several response options. The issue of task credibility could potentially occur for any task, but seemed particularly relevant with the activity used to test Hypothesis 4. One possible reason is that the use of engaging video to set the scene triggered multiple associations in the experts' minds, and sparked many ideas about how they would resolve the dilemma. When presented with the three response options, some experts appeared to feel disenfranchised because none of the options was perceived as appropriate to the task; as a result, they seemed inclined to dismiss the subsequent feedback as irrelevant.

Portrayal of the intervention. Credibility was also lost if experts perceived a mismatch between their image of the way the intervention (i.e. the selected response option) *should* have unfolded, and the manner in which the intervention *was portrayed* in the video. Under those circumstances, the subsequent feedback was sometimes dismissed, particularly if it implied that the selected option was incorrect, and if the expert felt that their own execution of the intervention would have been successful. One expert recommended that to avoid rejection, the video needed to be positioned as showing just one of many ways of carrying out the intervention.

> "So, you can draw an extreme example, that's fine, but you need to position it properly. Otherwise there's a danger that you treat your learners like idiots, because they'll be doing exactly what I'm saying *'well, I wouldn't do it like that', 'I would do that but I wouldn't do it that way'*. And then you [as learner] start to get annoyed." [SF9]

Portrayal of the consequences. The third point of potential loss of credibility was on receiving the video feedback. For most experts and some novices, the feedback was dismissed if it was portrayed as the only outcome, ignoring legitimate variability due to contextual variables such as personality differences. Reflecting on this flaw, some experts commented that the feedback needed to *suggest*, not *tell*, and should be positioned as one of many possible outcomes. Whether this design modification would work is open to question: whilst a change to a suggestive tone might make the experiential feedback less irritating to relativistic learners, it would not necessarily make it more credible. Other experts commented that experiential feedback should portray several possible outcomes.

For different reasons, interviewee SF4, an intermediate, dismissed the experiential feedback as "so predictable": she felt it reflected an idealised and artificial world, and therefore offered no guidance for the real world.

Findings relating to the analytic feedback ('4b')

Evaluations of the analytic feedback (4b) were mixed: novices were generally satisfied with it; experts were often disappointed. The negative evaluations given by the experts seemed to relate more to the specific content than to the concept of analytic feedback. For example, some experts complained that the analytic debrief lacked process coverage: it failed to address the question of how to follow-up the immediate intervention with the supplementary actions needed to ensure achievement of the intended goal. The tone of the analytic feedback also aroused dissatisfaction. Several experts commented that the tone was as deterministic as the experiential feedback.

8.5.4 IMPLICATIONS

An implication from these findings is that the effectiveness of (vicarious) experiential feedback is limited by the difficulty of learning inductively from isolated examples. Findings indicated that novices need experiential feedback to be supplemented by analytic feedback, and that experts will reflect on experiential feedback only if they perceive it to be a credible portrayal of the likely consequences of implementing a solution.

8.6 H5: LEARNERS' PREFERENCE FOR RETROSPECTIVE COVERAGE

H5: With decreasing expertise, learners prefer feedback to cover all response options in a multiple-choice task, and not just the option selected.

8.6.1 RATIONALE

Retrospective coverage related specifically to multiple choice questions ('MCQs'). In this thesis, feedback is defined as having retrospective coverage if it addresses each of the MCQ response options, and not just the option which was selected by the learner.

Findings from studies 2 and 3 indicated that having received feedback for their selected response option, interviewees were often concerned to know why the others were correct or incorrect. These studies suggested that retrospective coverage was particularly important for novices, and Hypothesis 5 aimed to tested this proposition.

8.6.2 MATERIALS

Hypothesis 5 was tested using an activity from *Coaching Advantage*, which was used in study 2. The activity was based on a discussion between a coach and his protégé on the topic of the protégé's self-assessment form which was to be submitted to his appraisal manager. Interviewees were asked to complete a closed, MCQ question, and then received feedback which provided verification and some explanation. Interviewees were asked to comment on the feedback.

8.6.3 FINDINGS

Feedback type	Average rating				Average weighted outcome			
	Avg. total	Nov	Int	Exp	Avg. total	Nov	Int	Exp
5) verificational & explanatory	2.8	3.2	2.5	2.5	-0.1	0	0	-0.3

Table 27: Results table for hypothesis 5

This proposition was supported. Among novices, three wanted retrospective coverage of all response options, and the remaining two wanted just to be told the correct response. Among intermediates, two wanted retrospective coverage, and one gave an ambiguous response. Among experts, all felt that retrospective feedback was unnecessary, and two gave a strong statement to the effect that they "knew" why the alternative response options were correct or incorrect.

Several novices expressed a sense of confusion if feedback lacked retrospective coverage.

> "The question that pops in your head is, 'well what's wrong with the others?' If this is correct ... then what's wrong with the others? I could have done the other things, and what is the problem with them?" [SF2]

Novice SF3 wanted to understand how to determine the circumstances under which each response options *might* be appropriate. She explained that she would prefer:

> "...some sort of discussion as to why it might be useful to do this, and why -. It could say, as it says here, that 'it's only useful if he needs the information but you really need to find out about his needs and issues', but in a way that shows that there are thought processes around each one and it really depends on the way that you approach the whole issue rather than - because I'd go back and keep checking each one to see what the different information was." [SF3]

Implicit in the comments from SF3 was a lack of confidence in her understanding of the topic, and a desire to deepen and consolidate her knowledge. Novice SF7 expressed a similar sentiment.

> "It's quite useful to get the feedback for all the other options, actually. Giving you the feedback for the other options will tell you why those other options are wrong, even if you got the correct one, and so that way it's reinforcing the learning even further, because it's probably saying the same thing in a slightly different way. So you'd get that clarification." [SF7]

For SF7, multiple explanations were better than one. They gave different perspectives and allowed for greater clarification by repeating the key learning points in slightly different ways. The two remaining novices did not reflect such a mindful orientation, and simply wanted feedback to explicitly state the correct answer.

> "It doesn't faff around. It tells you if you're right or wrong, first. And that's all you need. That's all I need, anyway. ... It should say, the correct answer was X, because -." [SF12]

Although none of the experts indicated that they wanted retrospective coverage in order to make sense of the activity, they were not entirely dismissive of it. Several experts implied that they wanted the feedback to be less dualistic. For example, the comment below supports the findings relating to Hypothesis 1 where it was found that interviewees wanted the verificational feedback to be more explanatory. In the following quote, SF1 suggests that the feedback should indicate the next steps in dealing with the protégé, and that by doing so the feedback would have embraced the other MCQ response options.

> "I don't believe the others are entirely wrong, they are just out of sequence, so I might look at the other pieces of feedback. ...[this feedback] just said "you've got the correct answer", and it didn't answer the 'so what do you do next' question which I believe it should have. I'd prefer it to say "*Correct, but you need to progress so the next steps to take are dot, dot, dot.*", which would then have taken in my points about having several more actions." [SF1]

Most experts acknowledged the advantage of offering learners the option of retrospective feedback, covering all the available response options.

8.6.4 IMPLICATIONS

An implication from these findings is that retrospective feedback - which addresses each of the MCQ response options, and not just the option selected by the learner - should be available to all learners, either embedded in a single piece of feedback, or made available using hyperlinks to the additional information.

**** **** ****

The purpose of study 4 was primarily to investigate the validity of the five hypotheses. Interviewees' responses to the feedback design were questioned and probed in order to understand the influences behind those responses, and these were discussed above. Another aspect of interviewees' responses to feedback was also revealed: perceived credibility. Findings indicated that the perceived credibility of the feedback and the activity as a whole was an important influence across all of the feedback examples, for many interviewees. The importance of credibility it discussed next.

8.7 CREDIBILITY

An important issue to emerge in study 4 was that of perceived credibility. What was important for interviewees was the credibility not only of the feedback itself, but also of the preceding task. Credibility of the activity was particularly important for experts. A count of NVivo 'credibility' codes showed that experts mentioned the problem of lack of credibility more than twice as often as novices. What follows is a discussion of interviewees' perceptions of the credibility of the task and feedback.

8.7.1 PERCEIVED CREDIBILITY OF THE TASK

An issue raised by novices and experts was that of cultural differences. Activity examples 2 and 4 were derived from *Navigating the Grey*, which was produced in the organisation's North American offices using local actors and scenarios. Several interviewees felt that the specific scenarios did not transfer well to a UK context, even though the underlying problems were relevant across the organisation. In the minds of interviewees, lack of transferability seemed to devalue the whole activity.

> "This [Ex2 task] is very American [laughter], in terms of political correctness, just taking it to the extreme. I don't know, what's the value of a big game ticket? It might be a lot, but I think they'd do the same for a very small ticket item. ...I mean, I've never been in a situation like that [laughter], and I sort-of can't see it, so it's not very relevant for me. It is, yes, it seems artificial." [SF8]

> " This [Ex2 task] is one the CBTs where cultural differences are not -. For me, any feedback on it will only tell me about the specific case of America, so I guess I would - at this particular moment I have to think like an American." [SF2]

From the perspective of theories of situated learning, cultural differences are particularly problematic for instructional design. Situated learning theories emphasise that the learning process is intricately linked with an individual's identity and participation in communities of practice (Clancey, 1995). The implication is that if training is perceived as relating to non-participant communities, it may be dismissed as irrelevant, as was the case with these interviewees.

Another issue raised by experts was lack of credibility of the question. Comments indicated that questions were perceived as lacking credibility if interviewees' saw a mismatch between the answer implicit in the question, and the interviewee's mental model of the topic and likely answer. Interviewee SF9, for example, questioned the validity of the question in activity 3, which asked learners to jot down the five key points to be raised in a project kick-off meeting.

> "... it says '5 key points'. I'm assuming there's a reason for saying '5 key points', and that's been introduced somewhere in the tutorial. If I was coming cold to that, and I was asked to put down 5 key points, I would be very very iffy about that, because 5 is a funny number. '5' tells me they've got a pro-forma they're working to. *It may be very different from my own personal pro-forma which might be just as valid*. So unless that's been introduced beforehand, I would be going 'oh, hang on, I don't think I need 5, I need 4, or 10 or whatever'." [SF9 italics added for emphasis]

These findings suggest that if learners perceive a task to lack credibility, they may downgrade their expectations of the utility of the feedback, and adopt a less mindful style-of-engagement when completing the task and reviewing the subsequent feedback.

8.7.2 PERCEIVED CREDIBILITY OF THE FEEDBACK

Findings indicated that novices and experts used a variety of strategies for judging the credibility and validity of the feedback, not all of which were available in the storyboard or original e-learning applications. Novice SF7 wanted an external point of reference - something representing 'true knowledge' - which he could use as a standard against which to judge the credibility of the feedback.

> "With CBT you don't get to see any of the research that goes behind it - the research sources. So you could always have web links to related sites saying "this is the method for dealing with this, or this is our policy on this issue. ...It would help you confirm that the information in the CBT is correct, because of the reference to the research sources." [SF7]

Some of the younger novices, as mentioned previously, showed a deference to external standards ("received knowledge", Belenky et. al., 1997), as well as a reliance on a inner instinct ("subjective knowledge", ibid.). Interviewee SF3 demonstrated both strategies when explaining how she judged the credibility of the feedback.

> "I think you always judge it against the way you would instinctively react, especially if it's one of these instinctive, ethical-type things, whereas if it's in relation to solid theory no-one can really argue with it. If someone's putting a different perspective on it then I think you're always referring - with what someone else is saying - you're always comparing it to your point of reference, whether that's a theory that you've learned at some other time or what your lecturer's saying or whether it's an instinctive thing. But I think if you know someone's grade that does affect the way that you -, the importance you place upon their opinion." [SF3]

Interviewee SF3 and another novice both expressed a faith in the validity of the content in applications developed by the organisation, because they believed that it would have been carefully vetted by a panel of senior designers and subject matter experts.

By contrast, none of the experts talked about relying on external sources to validate the feedback. Instead, they seemed to rely on their own resources. Findings indicated that experts judged feedback based on an assessment of the extent to which it reflected the reality of their prior experiences: did it reflect real-life practice, or did it promote an idealised way-of-behaving which was espoused by the organisation? Feedback judged to be idealised and artificial tended to be dismissed as irrelevant. For example, the feedback for activity 4 provoked criticism from several experts because they felt it reflected an idealised world.

> "It's just so predictable [laughter]. [Recalling comment from video] *'Yes, yes, sure, everything is fine'*. No, I'm sorry, I hate this. But that's my personal point of view. We're not in an ideal world, and this reflects an ideal world." [SF4]

Novices occasionally commented that the feedback seemed artificial, but less frequently than the experts. Novices seemed to use a different yardstick with which to assess feedback's

'realism'. When asked how they would assess realism, several novices used a criteria of whether scenarios represented a real-life past event and was therefore 'true' in an objective sense irrespective of whether a 'true' scenario confers any greater lessons than a composite scenario.

Cultural differences was an issue that concerned novice and expert alike, in ways similar to those already explored above in relation to the task.

Credibility was also lost if interviewees disagreed strongly with the content of the feedback. This happened rarely, and only with experts. A more insidious, and potentially more damaging problem raised by experts concerned a perceived lack of *balance* in the feedback. On several occasions feedback was criticised because it lacked adequate issues coverage or process coverage. For example, some experts dismissed feedback if the issues it raised did not did fit with interviewees' broader mental model of the topic.

> "It's credible, it's right. There's nothing there that I disagree with ...The person who wrote this is writing from their experience... but where I've come from - small developers like XYZ or ABC - every halfday is budgeted, and you don't have much cushion, and to go and meet people, you really have to work out if you're making good use of your time." [SF6]

> "[The model-answer feedback in activity 1] is in absolute terms 'right', but there are all sorts of other variables, like "do we want to do this? do we think it makes the business case better or worse? do we think it's advisable or inadvisable". All those sorts of things I'd want to be raised aswell. ... It's sensible. But *it falls short of being living*." [SF10 - italics added for emphasis]

Finally, interviewee SF10 raised the important point that as recipients of information, e-learners have few proxies and heuristic methods with which to judge the quality of e-learning, including the feedback contained within it. His comments and those of others above suggest that external accreditation alone will not necessarily confer credibility to e-learning.

> "We're much more in control of text on large volumes of paper. We have the skills of seeing whether it's dog-eared, seeing how fat it is, judging from the type-faces, judging from the weight of the whole document how much it's worth reading this bit. We don't have those skills with text-on-screen. ... How do you judge the quality of a website, because it is very, very easy to produce something which is very good-looking - layout etc. We judge a newspaper by ... page 3, and the type-face, and the advertisements in it. We don't have those skills for [e-learning]." [SF10]

8.7.3 DISCUSSION RELATING TO THE IMPORTANCE OF PERCEIVED CREDIBILITY

The primary aim of study 4 was to test the five hypotheses which had been developed from earlier studies. However, the importance of perceived credibility of the task and feedback was a common theme to emerge from discussions with many interviews, particularly intermediates and experts. These findings were believed to be important enough to warrant presentation and discussion in this chapter.

The importance of credibility had been indicated in earlier studies, and a re-reading of all transcripts suggested that credibility was an influencing factor not only for interviewees in study 4, but also for interviewees in earlier studies. These findings prompted the question of whether

to include perceived credibility as an attribute of feedback in the conceptual framework. Credibility was clearly important, but its influence was more of a secondary influence than a primary influence, and was therefore not explicitly represented on the framework.

8.8 CONCLUDING REMARKS

This chapter presented the findings relating to the testing of five hypotheses which were developed from earlier studies. Of the five hypotheses, two were supported, two were partially supported, and one was not supported. Where hypotheses were not supported or only partially supported, interviewees' comments were investigated in order to try to identify explanatory reasons. In several cases, these investigations revealed the existence of intervening variables which influenced interviewees in ways not anticipated by the original hypothesis. The implications of the findings were discussed for each of the five hypotheses. This chapter concluded by discussing the importance of the perceived credibility of the task and feedback.

8.9 CONCLUDING REMARKS TO PART FOUR

The four studies conducted for this research explored learners' expectations of, and responses to e-learning feedback, and tested hypotheses relating to learners' responses to differences in feedback's elaborative attributes. The findings from these studies were presented in Part Four of this thesis.

Two important themes emerged from this research. Firstly, from the learner's perspective, the function of feedback is to enable them to achieve a sense of closure by satisfactorily answering the questions raised in their minds by the task as well as meeting their expectations from feedback. Secondly, learners' outcomes (i.e. sense of closure) on receiving feedback are influenced by their level-of-expertise. An important implication is that unless feedback is adaptive to learners' level-of-expertise, the likelihood of their achieving closure on receiving feedback is reduced, which may lead learners to downgrade their evaluation of the utility of e-learning feedback.

Another important contribution from this research was the conceptualisation of key factors which, for the sample of learners interviewed, enabled them to achieve closure. The conceptual framework was developed throughout the period of research, and chapters 6, 7 and 8 discuss its different components. The framework shows that an understanding of learners' expectations and responses to feedback requires an understanding of their interaction with both task *and* feedback, which involves their sense of inquiry, assessment of personal risk, style-of-engagement, generic expectations of feedback, and outcomes on receiving feedback.

The next chapter consolidates the analysis presented in Part Four by drawing together discussions pertaining to the conceptual framework. Chapter 10 goes on to discuss the implications of the findings.

PART FIVE

SUMMARY AND DISCUSSION

CHAPTER NINE
SUMMARY OF FINDINGS

9.1 INTRODUCTION

The purpose of this research was to investigate and conceptualise learners' expectations of, and responses to e-learning feedback. In many ways, this study represented a shift away from the traditions of prior feedback research, particularly the emphasis on the structural attributes of feedback (such as timing) and the use of pre- and post-instructional test scores as 'objective' measures of feedback's putative effectiveness. In making the shift, this research addressed recent calls in Mory's (1996) review of the feedback literature for "fresh ideas and perspectives", given "the inconsistencies in the feedback literature". Furthermore, the empirical setting - business learners using authentic e-learning applications to develop problem-solving skills - addressed the previously-stated need that "future studies should examine feedback in more complex environments that involve high learning outcomes" (Mory 1996).

Given that this research aimed to investigate feedback in new empirical settings and from new perspectives (i.e. the learner's), it is not surprising that there were few theoretical frameworks to guide its design. An exploratory approach was therefore deemed suitable, and the research questions were more descriptive than explanatory. As the research progressed, interpretation of findings suggested themes, concepts and relationships which could be combined in a new conceptual framework to describe learners' expectations and responses to feedback. It is suggested that the new framework could be a useful heuristic tool to help interpret the responses to feedback of business learners using e-learning applications to develop their problem-solving skills.

Previous chapters presented the findings from a chronological perspective, showing how the research evolved in response to earlier findings, and showing the development of the conceptual framework. The advantage of a chronological approach is that it provides a coherent storyline; however, a narrative structure does not necessarily link directly to the research questions. Therefore, this and the following chapter give an alternative perspective by presenting a summary of the findings as they pertain to the research questions. This chapter presents each of the first four research questions followed by a one- or two-sentence summary of the findings as an answer, and then a comprehensive explanation of those findings. The next chapter discusses the remaining research questions pertaining to the theoretical and empirical contributions of this research.

9.2 LEARNERS' EXPECTATIONS OF FEEDBACK

Q1: What did learners expect from e-learning feedback?

Learners expected feedback to enable them to achieve a sense of closure to the task.

This thesis has argued that learners expected e-learning feedback to enable them to achieve a sense of closure to the immediately-completed task.

Closure is defined as the perception that expectations - arising *specifically* from the task, and *generically* from learners' expectations of what constitutes good feedback - are satisfactorily met. The relationship between learners' expectations, feedback, and learners' sense of closure are represented in the following conceptual framework, which is discussed during this chapter.

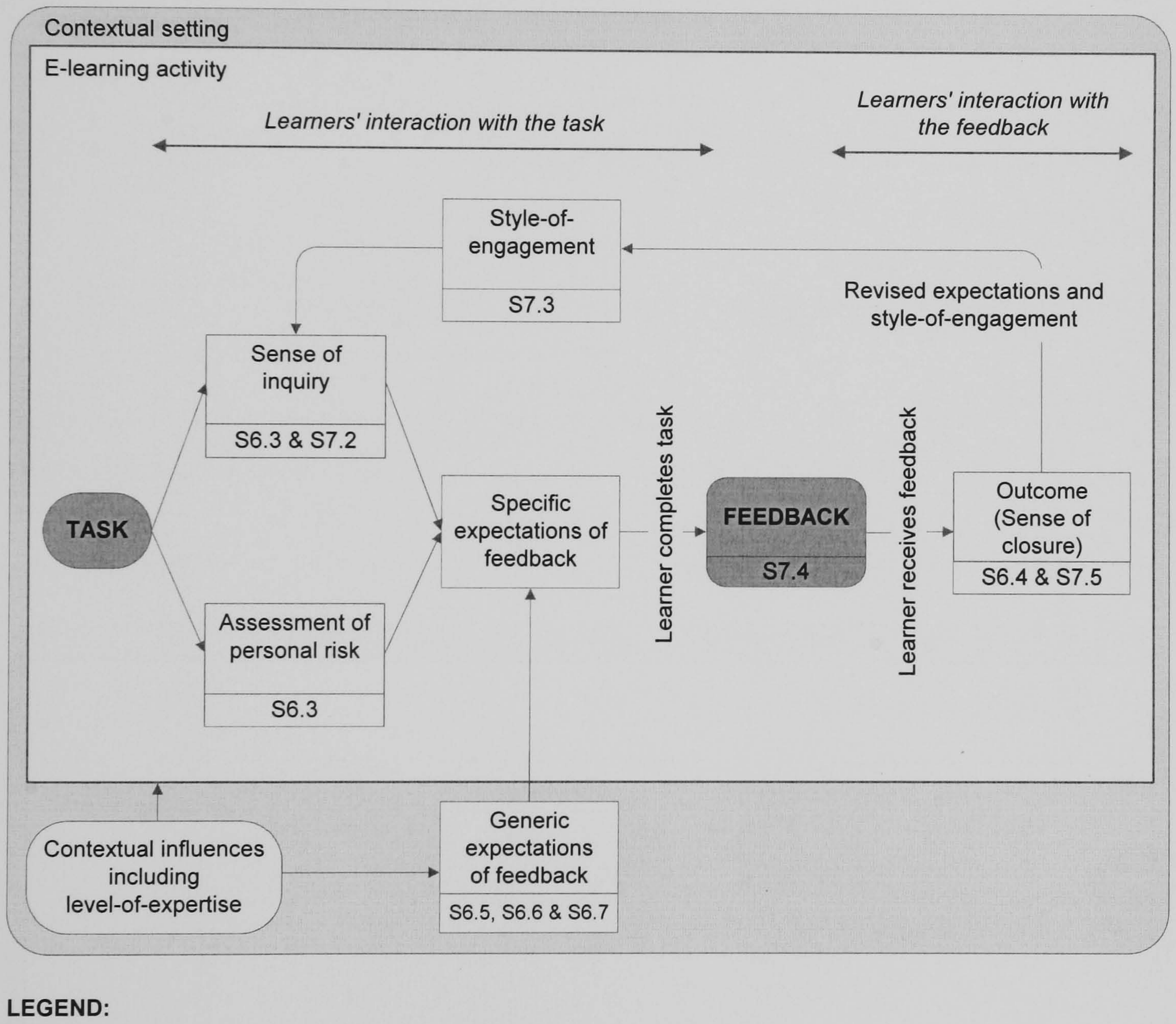


Figure 24: Conceptual framework representing learners' expectations of, and responses to e-learning feedback, mapped to relevant sections of this thesis

The importance of closure is not adequately represented in current theories of the function of feedback. Prevailing conceptualisations of the function of feedback focus on its *instructional* function, which is understood in the context of its referential theory of learning: reinforcement in behaviourist theories; error-correction and explanation in information-processing theories; an aid to reflection and construction of knowledge in constructivist theories; and dialogue in socio-constructivist theories (Askew & Lodge, 2000; Jonassen, 1991; Mory, 1992, 1996; Kulhavy & Wager, 1993).

Findings from this research indicated that from the learners' perspective, the feedback functions listed above were no more than a *means to an end*, where that 'end' was a sense of closure. By itself, the instructional function of feedback did not fully account for learners' sense of closure. From the learners' perspective, three additional elaborative attributes of feedback were also important: epistemic perspective, content, and contextualisation. These attributes are discussed in the following sections.

9.3 INFLUENCES ON LEARNERS' EXPECTATIONS

Q2: What influenced learners' expectations of e-learning feedback?

Learners' expectations of each instance of feedback were influenced by four factors: sense of inquiry generated by the task, assessment of personal risk, style-of-engagement with the e-learning application, and generic expectations of feedback. The effect of these factors varied with level-of-expertise.

A phenomenon as personal and intangible as a learner's expectation of feedback can only be inferred, not objectively measured. For this research, such inferences were determined by: questioning learners about their previous experiences of e-learning feedback; by soliciting their opinions about new feedback designs, or what was 'useful' in - or 'missing' from - feedback; and by observing and interviewing learners as they completed storyboard activities comprising tasks and feedback. Findings indicated that, for this sample of business learners, four factors were particularly important influences on their expectations of feedback:

- Sense of inquiry) generated by the task
- Assessment of personal risk)
- Style-of-engagement with the e-learning application
- Generic expectations of feedback

Findings indicated that these factors influenced one or more aspects of learners' expectations of the elaborative attributes of feedback:

- Instructional function
- Epistemic perspective
- Content
- Contextualisation

The motivational function of feedback is not included in the list of principal influencing factors because it was not indicated as an explicit expectation of the learners interviewed. Cognitive motivational theories such as expectancy-value theory argue that positive feedback enhances learners' sense of self-efficacy, whilst negative feedback makes them work harder (Petri, 1996; Brown et al., 1998). Motivation is certainly important in any learning theory; nevertheless, the motivational function of feedback was rarely mentioned by this group of learners.

Prior research has shown that structural attributes also influence learners' outcomes on receiving feedback; however, given the focus in this research on feedback's elaborative attributes, a systematic investigation of feedback's structural attributes was not in scope.

A summary of findings relating to each of the four elaborative attributes is given in the remainder of this section.

Findings suggested that learners' expectations were generated *by the task* in two ways: by creating a sense of inquiry, and by prompting an assessment of personal risk ('APR'). These influences are defined below. Section 9.3.3 then describes how they influence expectations of feedback.

9.3.1 SENSE OF INQUIRY

In the literature on learning and education, learners' goals are recognised as the driving force behind their efforts to understand the training material. There is much discussion at the macro level about whether learners' adopt *performance* or *learning* goals (Dweck & Elliott, 1983; Dweck & Leggett, 1988), and of the nature of their orientation or approach (Marton & Saljo, 1976, 1984; Entwistle, 1988). The micro level at which learners engage with specific tasks has also received attention, for example in Keller's ARCS model of instructional design (1983, 1987), since it is at this level that learners' make their most focused effort.

In this research, findings indicated that learners' expectations of feedback were influenced by their sense of inquiry. Learners with a high sense of inquiry were strongly interested in the task: it prompted questions in the learners' minds which generated an expectation that feedback would provide appropriate answers and thereby generate a sense of closure. In the language of 'goals', a learner's goal on receiving feedback was to achieve closure.

Learners' sense of inquiry was generated by a task which promoted a sense of intellectual and empathic participation, and which was perceived as challenging and relevant to the workplace. Intellectual participation was fostered in various ways; for example, by tasks with multiple decision points, or by options which allowed the learner some control over the unfolding of the task. Empathic participation was fostered, for example, by tasks with engaging scenarios which drew the learner into the situation, such that they projected themselves into the scenario, or felt a curiosity to know 'how things turn out'. Challenge was also important to this group of learners, but to generate inquiry, the sense of challenge needed to be within the limits of learners' self-efficacy. If perceived as unachievable, which was the case with open questions which were perceived as unduly ambiguous, learners were more likely to be dismissive than challenged. The perception of challenge was influenced by learner's level-of-expertise.

9.3.2 ASSESSMENT OF PERSONAL RISK

Learners' assessment of personal risk ('APR') reflected their combined assessment of their capability to deal with the problem represented in the task, and the implications of failure in a business setting. In general, novices were more likely than experts to have a high APR, but this was not always the case: experts were sometimes more cognisant of the legal and compliance issues surrounding business problems.

9.3.3 EXPECTATIONS ARISING FROM SENSE OF INQUIRY AND ASSESSMENT OF PERSONAL RISK

Learners' sense of inquiry and APR generated specific expectations of feedback in terms of its instructional function, content and contextualisation, but were less influential regarding its epistemic perspective.

Instructional function

The instructional function is defined as the mechanism by which the e-learning feedback tries to 'teach', for example, by reinforcement, verification, correction, explanation, promoting reflection or advocating alternative perspectives.

Learners for which a task had generated a high APR tended to expect feedback which was verificational, corrective and explanatory; in those situations, discursive feedback was sometimes deemed inappropriately ambiguous. No strong patterns emerged between a high sense of inquiry and expectations of a particular instructional function: instead, expectations of the latter seemed to be influenced more by learners' *generic* expectations of what constituted good feedback.

Content

Learners' expectations for feedback's *content* related to both the specific content pertaining to the topic, and to the manner in which it was covered. It is difficult to generalise about topic-related content given its specific nature, but five themes emerged regarding learners' expectations of the manner in which the content was covered. The first relates to the dimension of *granularity*; the remainder relate to the coverage of *issues, process, conditionality*, and - for tasks with multiple response options - *retrospective* coverage.

Granularity of feedback is defined in this thesis as a dimension ranging from concrete to conceptual. Findings from studies 2 and 3 suggested that novices preferred concrete feedback, and experts preferred conceptual feedback, although this proposition was not fully supported in study 4 for reasons discussed in chapter 8.

Three aspects of coverage - issues, process and conditionality - were expected by several learners and were perceived as particularly important by experts and others who recognised the complex and situated nature of business problem-solving. These learners expected coverage of the *main issues* pertaining to the problem, the *problem-solving process* including explication of goals, and the *conditionality* of the proposed solutions including consideration of "what if?" scenarios. Learners' expecting issues, process and conditionality coverage seemed less interested in feedback which gave a simple, cause-effect explanation, and more desirous of feedback giving complex-derivational explanations or promoting reflection to facilitate what Rumelhart and Norman (1976) call "schema-tuning".

Retrospective coverage related specifically to multiple choice questions ('MCQs'), and not to open questions. Having received feedback for their own selected response option, learners were often curious to know why the others were correct or incorrect. This was especially

important with complex problems, since the MCQ distracters were sometimes plausible, not only to novices who might have guessed at an answer, but also to experts who could envisage circumstances in which all response options might be valid. In these circumstances, learners wanted feedback to retrospectively cover each response option in turn, explaining the rational for its correct or incorrect designation.

Contextualisation

Contextualisation is defined as the relating of feedback to the circumstances in which it applies. Findings indicated that for learners with a high APR, appropriate contextualisation of feedback was especially important: they wanted feedback to be grounded in reality and relevant to their workplace - "theories in use" rather than "espoused theories" (Argyris & Schon, 1996).

9.3.4 STYLE-OF-ENGAGEMENT

Prior research has indicated the prevalence of two general orientations towards study materials: a performance ('shallow') orientation, and a learning ('deep') orientation (Dweck & Elliott, 1983; Dweck & Leggett, 1988; Marton & Saljo 1976, 1984; Entwistle, 1988). It seems reasonable to assume that these general orientations translate into learners' styles of engaging with the e-learning applications. Certainly, learners' stated rationale for undertaking e-learning were either instrumental (illustrated by comments such as "it's compulsory", "to earn CE[23] credits"), or what the instructional literature (Salomon & Globerson, 1987) has termed "mindful" (illustrated by comments such as "to learn", "to understand").

However, as learners in studies 1 to 3 recalled their experiences, the 'instrumental' and 'mindful' orientations no longer seemed adequate to describe the range of learners' styles-of-engagement once they had begun the e-learning. In all, seven styles-of-engagement were identified, based on indicators such as expressed opinion and descriptive phrases. These are described in table 28. Findings indicated that styles-of-engagement influenced learners' sense of inquiry in the task, thereby also influencing their expectations of feedback; for example, learners' who were "going through the motions" were less interested in learning from the feedback than was the case with the "mindful" learners.

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[23] CE credits refer to "Continuing Education" credits awarded to employees for completion of classbased training and e-learning.

Style-of-engagement	Description
Mindful learning	An intentional, thoughtful approach towards the e-learning material, and a desire to learn, rather than merely 'pass a test'.
Looking for take-aways	Learners adopting this approach were keen to learn quickly and efficiently, by accumulating behavioural rules, best practice guidelines, process checklists and other tools and take-aways for future reference.
Exploring	A playful approach to learning. When completing a task, learners sometimes selected a response option which they knew to be incorrect, out of a playful interest to see what the feedback might be.
Watching TV	Learners were emotionally immersed in the scenario, as though watching a TV drama unfold. Learners were passive in the sense that they were not mindfully trying to identify the key learning points.
Playing the game	Learners focused on working out what the application wanted from them, and then following that lead. By thinking in tune, they hoped always to select the correct response (whatever their own preferred choice) and finish the e-learning quickly and efficiently. This approach was actively instrumental.
Getting through it	An instrumental approach, whereby the learner wanted to 'get through' the e-learning application as quickly as reasonably possible.
Going through the motions	Learners made swift guesses at the right answer, but were not particularly worried whether their responses to activities were incorrect or correct. This was a passively instrumental style, even more so than 'getting through it'.

Table 28: Summary of learners' styles-of-engagement with the e-learning applications

Findings indicated that learners shifted between two or even three styles-of-engagement during the course of the e-learning. Shifts between a mindful style-of-engagement to an instrumental one ('getting through it', 'going through the motions', 'playing the game') were particularly frequent. There were probably many reasons behind the movement between styles-of-engagement, but learners' comments suggested that two were particularly important: length of continuous time spent on the e-learning (and consequent tiredness and loss of interest); and an assessment of the value of the tutorials and activities to their 'real-life' work settings. For example, some learners taking the video-rich business ethics course dismissed the educational value of the activities which, in their view, failed to reflect the realities of their workplace environment. Those who nevertheless continued to enjoy the videos "for a laugh" shifted to a 'Watching TV' style-of-engagement with the effect that feedback was expected to fulfil an entertainment function rather than an instructional function. When questioned, some learners acknowledged that subconscious learning may have taken place, because they did recall the feedback when a similar situation occurred later in their workplace.

Comparisons between styles-of-engagement can be made by reference to two underlying dimensions - primary orientation and degree of learner-to-content interaction - as depicted in figure 25.

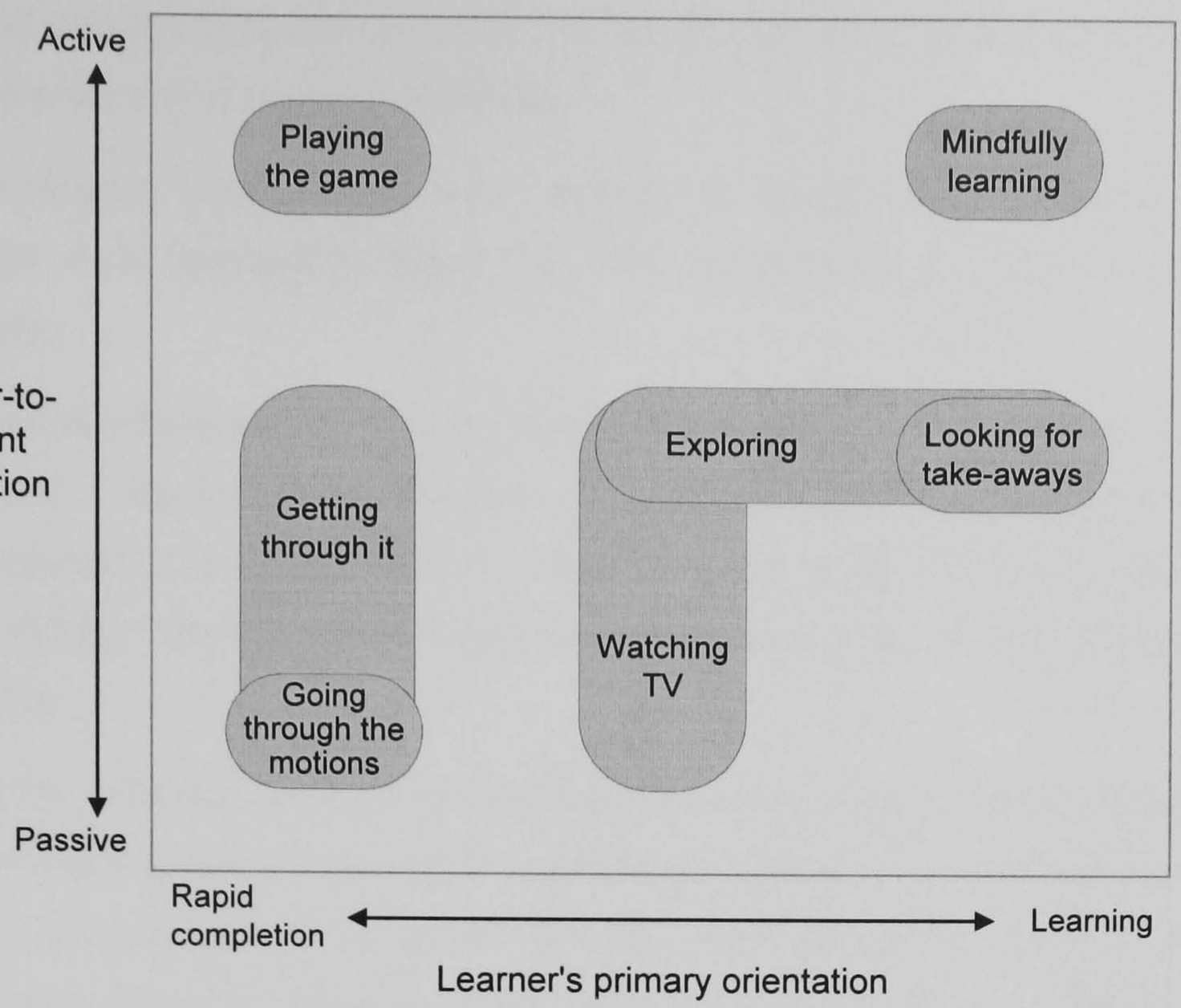


Figure 25: Styles-of-engagement by degree of learner-to-content interaction and primary orientation

9.3.5 GENERIC EXPECTATIONS OF FEEDBACK

Findings indicated that learners held generic expectations of feedback's instructional function and epistemic perspective. Epistemic perspective is defined as the perspective implicitly taken by the feedback with regard to the nature of reality, knowledge and learning.

Generic expectations were specifically investigated in study 1 by asking learners three questions: (1) what they perceived as "useful" feedback; (2) what was "missing", in general terms, from the feedback examples; and (3) which of nine feedback designs they preferred and why. The latter designs were developed with reference to the literature on instructional design, and to earlier responses to questions (1) and (2). Learners' generic expectations continued to be investigated in the remaining studies, and produced findings which supported those from study 1.

Findings indicated that learners' expectations differed depending on whether the task was 'open' or 'closed' (e.g. MCQ). Therefore, expectations for open questions and MCQs are discussed separately.

Expectations of feedback following open questions

Past experience lead some learners to tolerate model-answer feedback for open questions, but they often hoped for something different. When questioned about nine non-verificational feedback designs which could follow open questions, model-answer feedback was ranked only 9th. Greater value was accorded to feedback which explained the *process* of problem-solving rather than justified a single solution; or which warned about behaviours to avoid rather than just stated behaviours to follow; or which taught using examples rather than just theory. These

findings suggested that learners wanted more from feedback's instructional function than simple explanation or statement of the correct response.

Learners also indicated preferences with respect to feedback's epistemic perspective. Preferences were most noticeable along the two dimensions of dualistic:relativistic and experiential:analytic.

The dualistic:relativistic dimension draws on Perry's (1970) work on the epistemic perspectives of college students. His research identified a progression towards relativism as students developed in intellectual and ethical maturity. Perry's categorisation of the immature (dualistic) and mature (relativistic) students resembled the differences seen in this research between novices and experts.

When discussing the nine non-verificational feedback designs, novices tended to prefer dualistic feedback, such as key dos and don'ts ('KD&D') and best practice. This was perhaps because of their higher APR (assessment of personal risk) and their perceived need to construct the rudiments of a mental schema. Experts tended to be rather sceptical about the universal tone of dualistic feedback, but nevertheless recognised its value as a guide or benchmark. For example, experts ranked KD&D highly (2nd), perhaps because the 'don'ts' provided an insurance against making unanticipated mistakes when on a client assignment in the future.

The experiential:analytic dimension draws on Kolb's (1984) work on experiential learning. Kolb crafted a synthesis of the work of previous authors such as Lewin and Dewey, and contributed his own theoretical and empirical work. He conceptualised the cycle of experiential learning as one involving concrete experience, reflective observation, abstract conceptualization, and active experimentation.

In this research, when talking about what was 'missing' from feedback, both novices and experts said they wanted more real-life examples, more case-studies, and more about *practice* than theory. This finding supports Kolb's research showing that business undergraduates were typically more concrete and experiential than abstract in their learning styles (Kolb, 1984: 86). Paradoxically, the rankings for the non-verificational feedback designs did not support interviewees statements about what was 'missing'. The likely explanation is that when discussing the nine designs, many learners expressed a preference for a *combination* of designs, for example reflecting both the theory *and* practice of business problem-solving. The benefits of multi-function feedback were also indicated by findings from study 4, where novices tended to be confused by experiential feedback (which presented a video showing the outcome of a problem-solution) unless it was supported by an analysis of the key learning points.

Expectations of feedback following MCQs

Findings indicated that given the nature of closed-questions such as MCQs, feedback was usually expected to fulfill precisely those functions emphasised by information-processing perspectives on learning: to verify, correct, and explain. But to stop there without qualification would be a misrepresentation of learners' expectations:

- Firstly, for some learners, the desire for verification, correction and explanation seemed to be driven more by a curiosity to know the designers' designation for the correct response, than by a mindfulness to learn from it. Perhaps this is an automatic response to the stimulus of a MCQ.

- Secondly, expectations of 'explanation' seemed to cover cause-effect, complex-derivational, and well as facilitative explanations, depending on the complexity of the problem. A simple causal explanation was typically expected only for simple problems, or by novices who interpreted a complex problem as a simple one.

- Thirdly, verification, correction and explanation *by themselves* were not always sufficient depending on the mindfulness, epistemological maturity and prior knowledge of an interviewee. For some learners, closure was achieved only if feedback also promoted reflection, or advocated alternative ways to conceptualise the problem.

Learners also differed in their dualistic:relativistic preferences. Novices were relatively tolerant of dualistic, prescriptive feedback. Experts, however, tended to be irritated by a prescriptive tone. They often wanted feedback's style to be more advisory in recognition of the context-specific nature of most business problems and their solutions. In legal and compliance matters which generated a high APR, experts were often more cognisant of the need for prescriptive guidance - the "organisation's line" than novices.

Findings therefore suggested that whilst the programmed-feedback literature focuses on the reinforcing and informational functions of feedback, the generic expectations of some learners, especially experts, make more sense from the perspective of constructivist theories of learning. The instructional functions of feedback and their referential theories of learning are represented in figure 26, and were discussed in chapter 2.

Behaviourist	Cognitivist	Constructivist	Socio-constructivist
Reinforce	Explain Inform Correct	Promote reflection Provoke cognitive dissonance	Promote dialogue

Figure 26: Instructional functions of feedback according to the principal theories of learning

9.4 LEARNERS' OUTCOMES ON RECEIVING FEEDBACK

Q3: What were learners' outcomes on receiving e-learning feedback?

On receiving feedback, learners experienced closure or non-closure in ways which enabled categorisation of six outcomes: satisfaction, "OK", sense of incompleteness, confusion, frustration, and dismissal. These outcomes could be analysed along two dimensions - closure:non-closure and confidence:deference.

An investigation of learners' outcomes on receiving feedback offered another perspective on their expectations. By allowing learners to describe and reflect on experiences of closure or non-closure, the aim was to look for confirmations or contradictions with their statements about the non-verificational feedback designs (study 1 only) and on "useful" or "missing" aspects of feedback. Of particular interest were learners' outcomes where closure was not achieved.

Learners' outcomes were categorised in studies 2, 3 and 4, on the basis of indicators such as expressed opinion, descriptive phrases and tone of voice. These outcomes are shown in figure 27, by representing their positions along two dimensions: degree of closure, and what Lockwood (1992) has called the confidence:deference dimension.

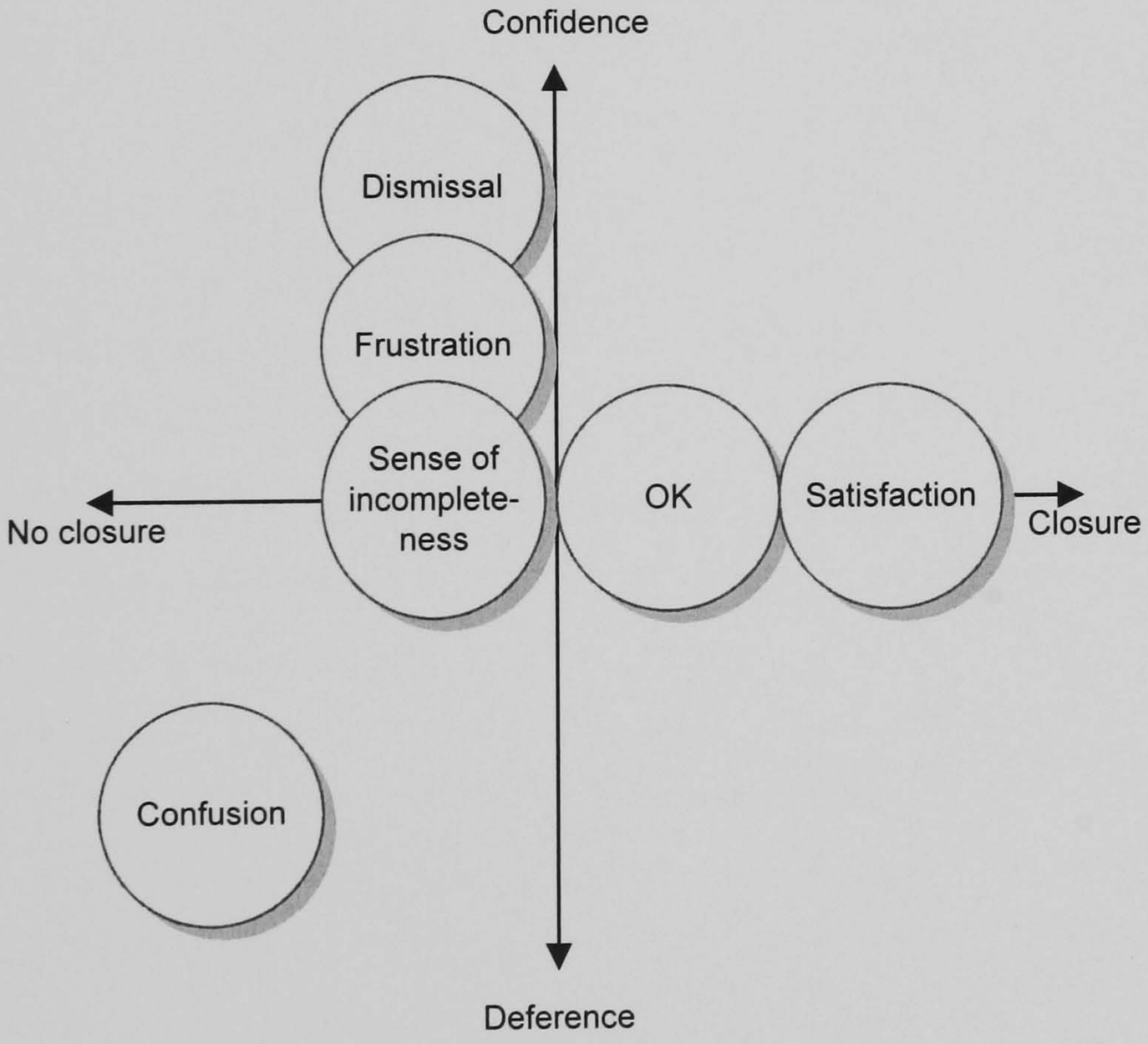


Figure 27: Learners' outcomes on receiving feedback, compared against dimensions of closure:non-closure and confidence:deference

Learners' apparent position along the confidence:deference dimension correlated mainly with their level-of-expertise. Novices were more likely than experts to defer to the authority of the 'computer' feedback at times of cognitive dissonance. Experts, on the other hand, were more likely to remain confident in their own opinion, having a strong sense of "self-ascribed epistemic authority" (Ellis & Kruglanski, 1992). In the comfort of such confidence, experts were more likely than novices to dismiss dissonant feedback without reflecting seriously on it. In some cases this also lead to a change in style-of-engagement because experts no longer trusted the credibility and validity of the feedback.

9.5 INFLUENCES ON LEARNERS' OUTCOMES

Q4: What influenced learners' outcomes on receiving e-learning feedback?

Learners' outcomes on receiving feedback were influenced by three main factors: the degree of congruence between feedback's attributes and learners' expectations of feedback, the perceived credibility of the feedback, and learners' sense of deference to the authority implicit in the feedback.

It has been previously argued that learners' specific expectations originated from: the task; their style-of-engagement; and their generic expectations of feedback. Expectations regarding the elaborative attributes of feedback can be categorised relating to feedback's instructional function, epistemic perspective, content and contextualisation. An attempt to unravel and isolate the interactions between expectations and feedback attributes would be difficult; therefore the following inferences are tentative. With this qualifications in mind, table 29 presents some of the tendencies indicated by the findings relating to feedback's elaborative attributes, and to learners' expectations, outcomes and level-of-expertise.

Findings also indicated a negative correlation between learners' mindfulness and outcomes, suggesting that more mindful learners may be more critical of feedback. A correlation was also shown between learners' organisational business unit and outcomes, with consultants generally the most critical of feedback, and audit and support staff respectively being more positive. However, mindfulness and business unit were not orthogonal factors. Therefore, it was not possible to identify a single underlying influence on outcomes, nor to determine whether individual differences (such as an innate mindfulness) were more or less influential than business unit culture or recruitment policies.

Where the feedback content provoked an initial sense of cognitive dissonance, outcomes varied from outright dismissal, to confusion, and even - paradoxically - to satisfaction. Findings indicated that learners' outcomes were influenced by their perception of feedback's credibility, and their position along what Lockwood (1992) has called the confidence:deference dimension. The latter dimension relates to learners' sense of self-confidence or deference regarding the implied authority of the e-learning instruction. Findings indicated that learners' self-confidence varied to some extent with their level-of-expertise. Novices who deferred to the implicit authority of the e-learning feedback tried hard to make sense of the feedback, but often seemed confused. Experts who were confident in their own epistemic judgements, and for whom the feedback lacked credibility due to factors such as poor contextualisation, were prone to dismiss feedback rather than try to make sense of it. Between these two extremes, it seemed that some learners learned something after reflecting on the dissonant feedback, sufficient to generate a sense of satisfaction and closure.

	ELABORATIVE ATTRIBUTES OF FEEDBACK	LEVEL-OF-EXPERTISE Novice ⟷ Expert	
Epistemic perspective	Instructional function	Verification: All learners preferred verification over non-verification, but many recognised its non-feasibility following open-question tasks.	
		Elaboration: Novices preferred corrective, explanatory feedback.	Elaboration: Experts wanted corrective, explanatory feedback, but also wanted feedback which promoted reflection, or which advocated alternative perspectives.
	Dualistic: relativistic preference	Novices preferred dualistic feedback, qualified by simple "what ifs?"	Experts preferred relativistic feedback, qualified by the organisation's best practice or 'key dos and don'ts' to provide a benchmark of common practice.
	Experiential: analytic preference	All learners wanted more real-life examples, more case-studies, and more about *practice* than theory.	
		Novices were more likely than experts to want feedback giving real-life examples to be supplemented by analytic feedback. When tested, novices were more likely to be confused by experiential feedback unless it was supplemented by an analysis of the key learning points	
Content	Granularity	Novices preferred concrete feedback, and were sometimes confused if feedback was conceptual and abstract.	Experts expressed a preference for conceptual feedback. In practice they sometimes found concrete feedback more meaningful because it triggered associated memories of similar experiences and related knowledge.
	Retrospective coverage	Lack of retrospective coverage in MCQs was likely to leave novices confused	
	Issues		If key issues were perceived as 'missing', or did not match their preconceptions, experts were unlikely to achieve closure.
	Process		If feedback ignored the process dimension to problem-solving, experts were unlikely to achieve closure.
	Condition-ality	Novices were likely to feel a sense of incompleteness if feedback did not elaborate on simple "what if's"	Experts were acutely sensitive to the conditionality of problem solutions, and dismissed feedback which neglected this aspect.
Contextuality	Realism	Experts and novices were dismissive if feedback was perceived as unrealistic, but had different benchmarks for judging feedback's realism.	
	Relevance	Experts and novices were dismissive if feedback was perceived as irrelevant to their working environment, but had different benchmarks for judging feedback's relevance.	

Table 29: General tendencies comparing experts' and novices' expectations and outcomes regarding e-learning feedback, for the sample interviewed

9.6 CONCLUDING REMARKS

This chapter has argued that the findings from this research can be explained with reference to a heuristic conceptual framework representing learners' expectations of, and responses to, feedback. By addressing the four research questions, the main components of his framework have been elaborated, with particular attention to the influencing factor of level-of-expertise. This chapter closes with an extended version of the conceptual framework.

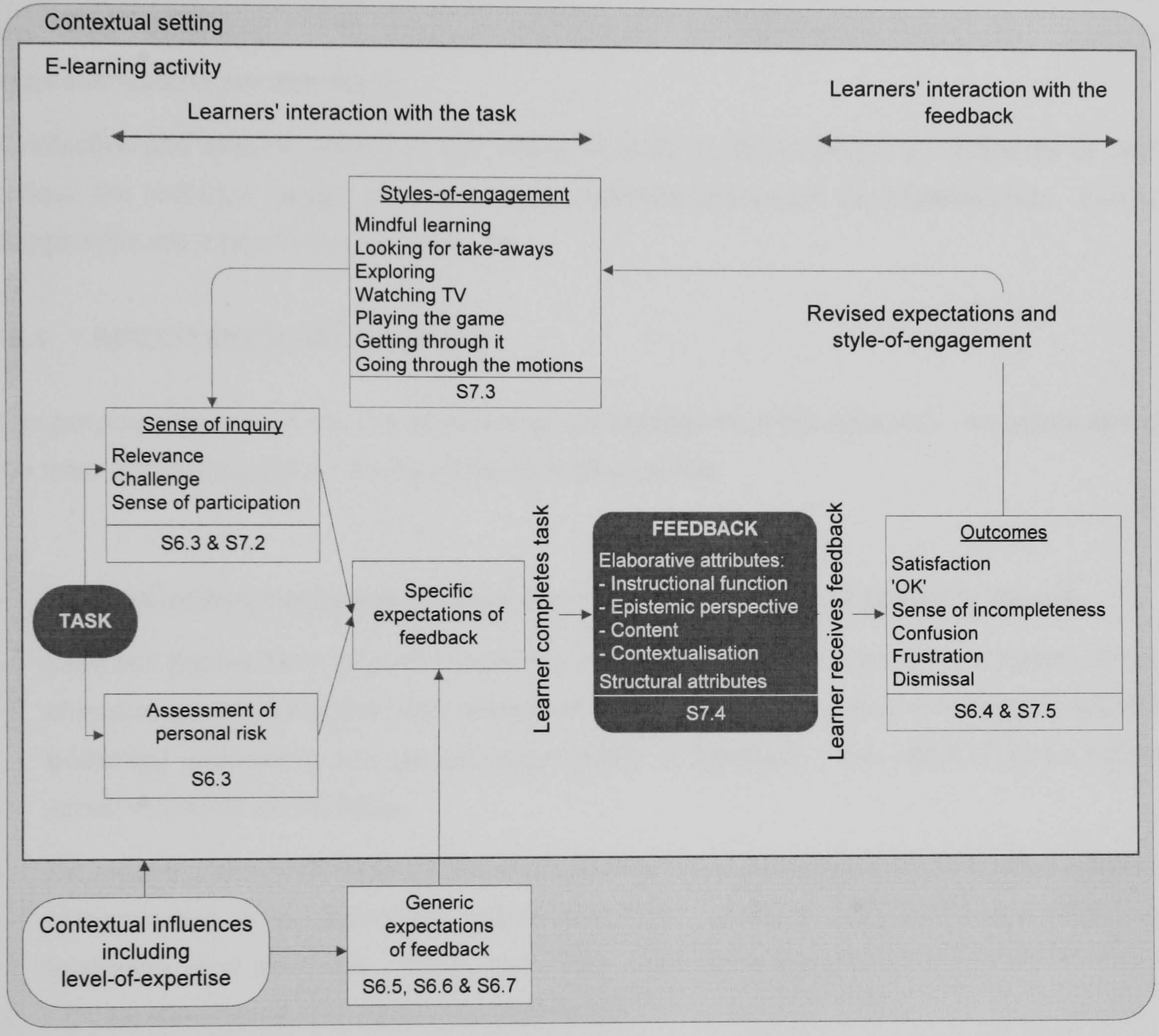


Figure 28: Conceptual framework (comprehensive version) representing learners' expectations of, and responses to e-learning feedback, mapped to relevant sections in this thesis

CHAPTER TEN

DISCUSSION

This chapter begins by briefly restating the key findings from this research. The theoretical contribution of this thesis, and an interpretation of the broader implications of the empirical work are then discussed. To support the efforts of instructional designers, concrete recommendations are also made.

A reflective and reflexive stance is then taken in order to: acknowledge the influence of 'self'; critique the research design; and identify its limitations and scope for generalisation. Finally, suggestions are made for further research.

10.1 RESTATEMENT OF FINDINGS

The previous chapter provided a summary of the findings from this research. A restatement of the main findings suggested by the research is given below.

- Learners expected feedback to enable them to achieve a sense of closure to the task.
- Learners' expectations of each instance of feedback were influenced by four factors: sense of inquiry generated by the task; assessment of personal risk; style-of-engagement with the e-learning application; and generic expectations of feedback. The effect of these factors varied with level-of-expertise.
- On receiving feedback, learners experienced closure or non-closure in ways which enabled categorisation of six outcomes: satisfaction, "OK", sense of incompleteness, confusion, frustration, and dismissal. These outcomes could be analysed along two dimensions - closure:non-closure and confidence:deference.
- Learners' outcomes on receiving feedback were influenced by three main factors: the degree of congruence between feedback's attributes and learners' expectations of feedback, the perceived credibility of the feedback, and learners' sense of deference to the authority implicit in the feedback.

10.2 THEORETICAL CONTRIBUTION

10.2.1 THE IMPORTANCE OF ACHIEVING CLOSURE

It is argued in this thesis that the existing pedagogies of self-paced e-learning feedback continue to be influenced mainly by behaviourist and information-processing theories of learning. These theories carry assumptions that feedback's function is to reinforce, verify, correct errors and/or explain. It is further argued that this conceptualisation of the function of feedback is limited, and fails to capture the essence of what learners expect from feedback. Findings indicated that from the learners' perspective, feedback's function is to enable them to achieve a sense of closure to the immediately-completed task. To do so requires that feedback meets learners' expectations not only of its instructional function, but also its epistemic perspective, content and contextualisation.

The theoretical contribution of this thesis is to highlight deficiencies in prevailing conceptualisations of the function of feedback, and to suggest alternatives. In doing so, this thesis does not claim to be theory-*building*, since the proposed conceptual framework is more tentative than definitive, and would benefit from further research to make it robust. Instead, this thesis contributes to a "theorising" (Weick, 1995) about the function and pedagogy of e-learning feedback, by proposing concepts such as inquiry, closure and coverage, and by proposing a conceptual framework depicting their inter-relationships.

10.2.2 RE-CONTEXTUALISING THE THEORETICAL CONTRIBUTION

The importance of "re-contextualising" (Morse, 1994) a theoretical contribution is also recognised, and for this research means providing a context in which the proposed conceptual framework is linked with established knowledge. The three most important linkages concern: (1) the concept of closure; (2) the established literature on learners' orientations to learning; and (3) Keller's (1983, 1987) ARCS model of motivational instruction.

Concept of closure

Closure is a concept which has received some coverage in the wider educational literature. Dubelle (1986, cited in Small & Venkatesh, 1994) described closure as the outcome of an activity that brings the major points of a lesson into focus, and Keller (1983, 1987) emphasised the need for learners to perceive the various pieces of instructional content as fitting into a coherent whole, thereby generating closure and a sense of accomplishment. The general presumption is that in an educational context, a learning task *must* be brought to closure (e.g. Phillips, 1987).

A slightly different perspective is obtained from the literature on decision-making. In this literature, closure has been described as occurring when a definite answer to a question - or a definite decision regarding a problem - is obtained, leaving no ambiguity or confusion. However, there is also recognition that individuals do not necessarily 'need' immediate closure,

and may delay closure in order to gain more information so that they can make a better decision (Kruglanski, 1989).

In this research, findings indicated that learners sought closure from feedback, but that a definitive 'answer' was not necessarily required nor deemed appropriate if learners recognised the complex and situated nature of problem-solving. In those circumstances, feedback which addressed the task in terms of relevant issues, alternative perspectives, or the *process* of resolving the problem were sometimes considered more valuable because they prompted reflection leading to a deeper understanding of the problem. However, past experiences of multiple-choice questions meant that most learners anticipated that one of the responses options had been designated as the 'correct' answer. Therefore, most learners expected as a minimum that feedback would inform them of that answer.

The literature refers to another aspect of closure which was also implicated in these findings: that of *premature closure*. In the context of children's reasoning abilities, premature closure has been defined as the tendency to offer to the teacher only a single solution to a problem which, because of insufficient or ambiguous information, logically permits more than one solution (Acredolo & Horobin, 1987). In the context of this research, premature closure may reflect a tendency for learners to *accept* - from e-learning feedback - a superficially-argued explanation for the designated 'correct answer'. Whether influenced by learners' passive engagement with the e-learning, or by other factors, premature closure carries implications of a stymied learning process.

Learners' orientation to learning

The literature on learners' orientations was introduced in chapter 7. This research extended the literature by describing the orientations of business learners engaged in e-learning applications designed to develop their problem-solving skills. These orientations were termed *styles-of-engagement* in this research, and were defined along two dimensions: *primary orientation* (rapid completion or learning); and degree of *learner-to-content interaction* (passive or active).

The dimension of *primary orientation* (rapid completion or learning) has parallels with dimensions from the literature on *goals* (performance or learning) and *depth of learning* (shallow or deep). The term "rapid completion" was used because the assessment format of some of the applications studied meant that successful performance (i.e. correct completion of activities) was not required for course accreditation. In those cases, some learners adopted a style-of-engagement such as 'going through the motions' where the primary aim was rapid completion of the application, irrespective of their performance in activities.

The dimension of *learner-to-content interaction* draws on the work of Moore (1989) and Homberge (1986, cited in Hawkridge & Edirisingha, 2002), and relates to the learner's active or passive interaction with the e-learning content. Findings indicated that active interaction (for example in the style-of-engagement 'playing the game') might promote subconscious learning even if learners' conscious aim was not one of mindful learning.

Keller's ARCS model of motivational instruction

Another important linkage concerns Keller's (1983, 1987) model for the motivational design of instruction, which identified four dimensions of motivation: attention (interest and curiosity), relevance, competency (i.e. sense of self-efficacy), and satisfaction. Whilst Keller's model was proposed as a generalisable instructional tool, this research was specifically focused on the experiences of a group of business e-learners. Findings indicated that the essential aspects of Keller's model resonate with the core process identified in this research of *inquiry followed by closure*. For example, *inquiry* was identified as influenced by learners' sense of participation in the task (including curiosity), the perceived relevance of the task to their workplace settings, and learners' assessment that the task was challenging yet also achievable (i.e. maintaining the learners' sense of self-efficacy). Similarly, *closure* related to the extent to which learners' expectations of feedback, arising from - among other influences - a sense of inquiry generated by the task, were satisfactorily met by the feedback received.

From this perspective, what Keller referred to as 'satisfaction' related largely to whether learners' questions were answered in ways which met their expectations. Keller suggested that learners' degree of satisfaction influenced their motivation to pursue similar learning goals; this thesis supports Keller's premise by arguing that learners' sense of closure on receiving feedback influenced their expectations of the value of future instructional activities, and their style-of-engagement with the application.

This research therefore supports the general principles suggested in Keller's model. It extends the model by representing the learners' sense of closure (satisfaction) or non-closure (dissatisfaction) as an interaction between four variables: learners' expectations of feedback, the attributes of feedback, learners' perception of the credibility of feedback, and learners' confidence in their prior knowledge and beliefs.

10.3 IMPLICATIONS OF THE EMPIRICAL FINDINGS

10.3.1 FINDINGS RELATING TO THE EXPERIENCE OF BUSINESS E-LEARNERS

This research made an empirical contribution by investigating the experiences of business e-learners, and their expectations and responses to self-paced e-learning feedback when developing problem-solving skills. Business e-learners have been neglected in the feedback literature despite their importance as a group which, given the commitment in time and resources devoted to business e-learning, is predicted to grow (Kelly, 2001).

Findings indicated that for the learners studied, level-of-expertise was an important influence shaping their expectations of feedback. The manner in which level-of-expertise influenced expectations and responses to feedback was demonstrated with reference to illustrative quotations from interviewees as well as analysis of numerical transformations of coded data.

Findings also suggested that interviewees' expectations and responses to feedback were influenced by their experiences of workplace learning. Many interviewees spoke favourably of their experiences of class-based learning. They spoke of the discursive and collaborative environment, the benefits of learning from "real-life" stories of others, the ability to discuss and explore "what ifs", and the sense that all participants had something to contribute. Class-based training provided opportunities where colleagues could network, share experiences, and learn informally as well as formally.

Compared with those experiences, the e-learning alternative was seen by some interviewees, especially those with higher levels-of-expertise, as inappropriately didactic for the complex skill of business problem-solving. It can be argued that the apparent disconnect between interviewees' expectations of the learning process and the reality of e-learning feedback relates to a fundamental difference in the *conceptualisation* of learning. In this regard, Sfard (1998) has captured the essence of the current academic debate by differentiating between the "acquisitionist" and "participative" metaphors for learning. She argues that both are appropriate, but under different circumstances.

Findings from this research suggested that many interviewees recognised the importance of didactic (i.e. acquisitionist) forms of instruction, particularly for legal and compliance issues such as problems of sexual or racial harassment, and for areas of high APR ('assessment of personal risk'). However, interviewees' comments suggested that for other areas of business problem-solving, such as problems involving project management skills, didactic styles of e-learning feedback were perceived as less suitable, especially by learners with higher levels-of-expertise. These findings indicated that e-learning feedback, *in the styles represented in the three applications studied*, has limited suitability for the development of business problem-solving skills.

Of particular concern was the indication that in the event of a serious challenge to learners' deeply-held beliefs, feedback was more likely to be dismissed than seriously considered: when interviewed, learners - especially experts - frequently used the argument that in different

circumstances, their own answer would have been right. Furthermore, it was not unusual for learners to justify their position by questioning the credibility of the "anonymous" subject-matter expert who was presumed to have scripted the e-learning content.

10.3.2 TRENDS IN THE E-LEARNING INDUSTRY

These findings have wider implications for the corporate e-learning industry, particularly since the applications used in this study were broadly representative of e-learning applications used in the corporate sector; furthermore, they were highly regarded within the organisation and, in one case, by the e-learning community[24]. However, the response of the industry to criticism has not been encouraging. Judging by a reading of the trade journals, one response has been a retreat from self-paced e-learning for 'complex' topics towards self-paced e-learning for courses limited to neatly-codified knowledge, such as induction courses (e.g. Clark, 2002) and technical courses. Another frequent response from the e-learning industry has been to acclaim, almost as a panacea, the benefits of "blended learning" (Lamb, 2001; Kiser, 2002; Helmer, 2002). This often translates to the sidelining of self-paced e-learning to an introductory course, whilst the continuation courses migrate to the real or online classroom.

As the debates of researchers and educational technologists shift to the arena of online learning, self-paced e-learning is becoming increasingly sidelined as a topic of research. This is in spite of the continued and growing use of self-paced e-learning in the corporate sector. In the area of e-learning feedback research, little evidence has been seen of applications which extend established pedagogies by designing feedback which recognises that learners' needs and expectations are influenced by their level-of-expertise as well as their prior experiences of workplace learning.

10.3.3 EMPIRICAL CONTRIBUTION OF THIS RESEARCH

This thesis makes a contribution to feedback research by indicating ways in which level-of-expertise influences learners' expectations of the elaborative attribute of feedback; namely, feedback's instructional function, epistemic perspective, content and contextualisation.

Findings relating to learners' expectations have informed the next section on recommendations for e-learning feedback design.

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[24] *Zentoria* received an OMNI Intermedia industry award in 2000 (www.omniawards.com).

10.4 RECOMMENDATIONS FOR INSTRUCTIONAL DESIGN OF E-LEARNING FEEDBACK

10.4.1 ADAPT FEEDBACK TO THE LEVEL-OF-EXPERTISE OF THE LEARNER

Findings indicated that level-of-expertise influenced interviewees' expectations in terms of the instructional function, epistemic perspective, content and contextualisation of feedback. Interviewees achieved a sense of closure only if those expectations were satisfactorily met. The implications are that the level-of-expertise of the learner, using an appropriate proxy measure, should be an input to e-learning applications so that programmed feedback-selection routines can deliver appropriate feedback. An alternative, if programmed adaptation is not feasible, would be to offer feedback using a 'layered' approach. This would mean giving all learners the option of choosing to receive whichever feedback 'package' they believe will meet their immediate needs.

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The remaining recommendations draw on findings with relevance to learners of all levels of expertise.

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10.4.2 DESIGN 'DIVERGENT:CONVERGENT' ACTIVITIES

Tensions existed between interviewees' recognition of the suitability of open questions for complex problems, and their desire for computer assessment. Because free-text responses to open questions could not be computer-assessed, many interviewees were left disappointed by having to rely on *self*-assessment by comparing their response to model-answer feedback.

'Divergent:convergent' activities could overcome this tension by combining open and closed questions, with non-verificational and verificational feedback. Open questions would prompt divergent thinking by allowing learners to consider a broad range of issues relating to the problem. Closed questions would prompt convergent thinking by presenting learners with a limited number of response options, thereby setting 'boundaries' around the problem.

The activity structure would therefore incorporate two prompts to inquiry, with a potentially deeper level of engagement. The proposed activity structure is represented in figure 29.

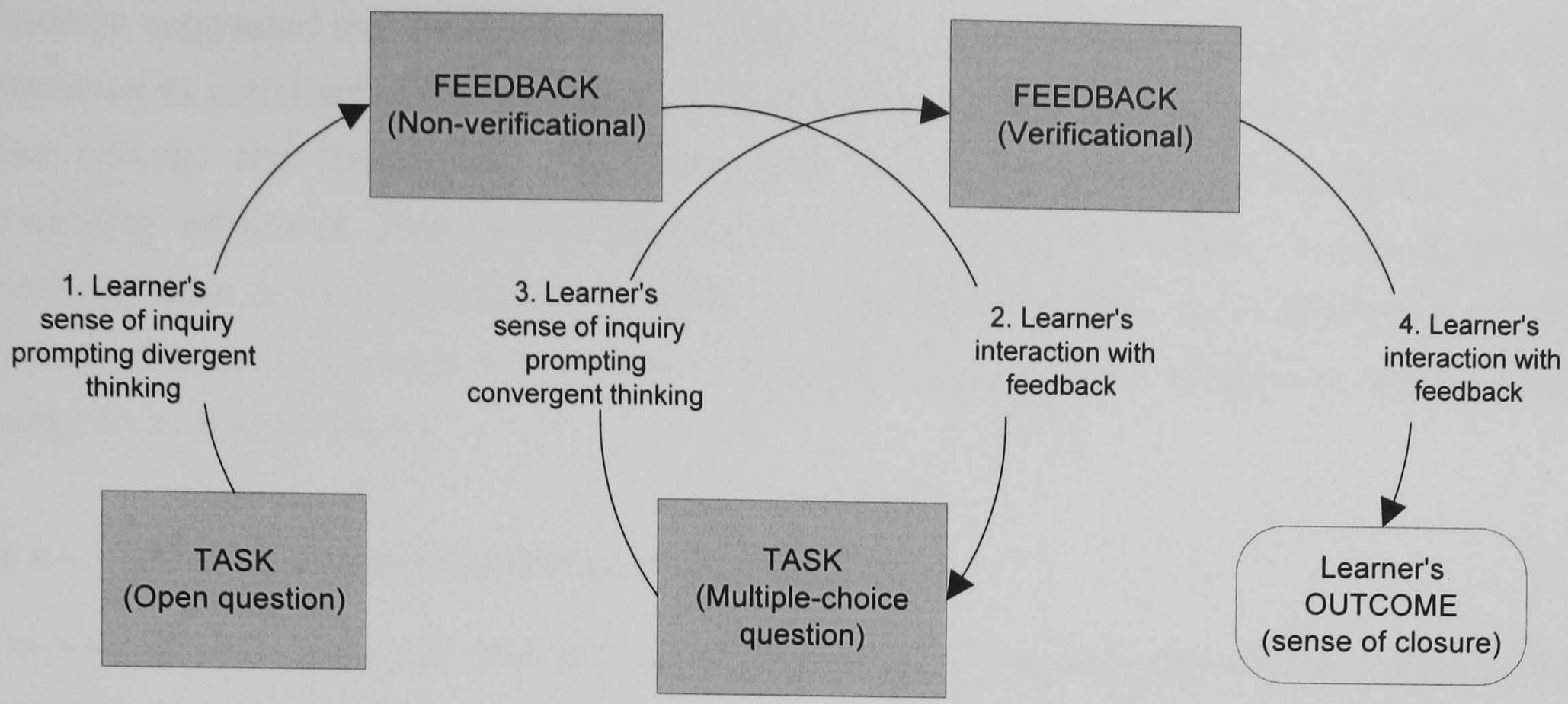


Figure 29: Proposed structure for divergent:convergent activity

10.4.3 DESIGN FEEDBACK WHICH COMBINES THEORY AND PRACTICE

A common theme to emerge was the desire for feedback which combined theory and practice, particularly in response to open questions, so that basic principles and guidelines could be communicated alongside stories from real life. Some illustrative examples are:

- 'key dos and don'ts plus examples of how the 'dos' translate into practice;
- video of the potential consequences of a solution's implementation plus an analysis of the key learning points;
- 'best practice' feedback plus the 'what ifs' which qualify their applicability.

10.4.4 DESIGN FEEDBACK WITH RETROSPECTIVE COVERAGE

Feedback for the MCQs studied in this research often carried an implicit assumption that once the correct answer was revealed, learners would understand why the distracters were wrong. Findings showed that this was not always the case, particularly for novices. Experts were more often than novices able to infer *why* the incorrect responses were incorrect: all they needed was notification of the correct answer. Nevertheless, many interviewees at all levels-of-expertise wanted feedback to retrospectively cover *all* response options and to explain why each option was either correct or incorrect. For the experts this was often a "nice to have", whilst for novices this was an important requirement to prevent feedback leaving them confused about the key learning points.

10.4.5 DESIGN CONVERSATIONAL FEEDBACK

Self-paced e-learning feedback does not constitute dialogue, yet Moore (1989) has pointed out that well-written material can promote *internal* dialogue between learner and content. To do so, the material needs to invite the learner to reflect on the messages contained therein.

Findings suggested that feedback did not always invite such internal dialogue. Several expert interviewees commented that feedback's tone should be more conversational and advisory, and less didactic and "preaching". Perhaps given the coaching-oriented environment of the consulting workplace (from which most interviewees came), the strident tones of didactic feedback were more likely to prompt irritation than mindful attention. As an alternative, several interviewees recommended a more conversational, coaching tone, unless the topic involved compliance or legal issues.

10.4.6 CREATE A WINDOW TO EXTERNAL CONVERSATIONS

Interviewees who were left confused about the feedback message had no point-of-contact to which to refer for clarification, and those who disagreed with it had no way to benchmark their views against those of others, or to hear alternative perspectives. Several interviewees indicated a desire for 'external' conversations.

Self-paced e-learning does not necessarily preclude the possibility of providing a window to external conversations. Many interviewees welcomed the idea of an external query-point (for example, contactable by email) which they could use on occasion if they felt very "stuck". Some interviewees welcomed the idea of a linked online discussion forum, although when pressed, few thought they would use it regularly. It seemed that external conversation was desired mainly to achieve closure where feedback had failed to meet expectations, and not to generate yet more divergent thinking.

10.4.7 ENHANCE THE CREDIBILITY OF FEEDBACK

Findings from this research suggest that an important deficiency of e-learning feedback was the absence of cues by which interviewees could judge feedback's credibility and validity.

If feedback provoked cognitive dissonance by challenging interviewees' core beliefs, it was dismissed and rejected. Similar reactions were identified in the research of Chinn and Brewer (1993), who found that *acceptance* of a feedback message was only one of seven possible responses to it. It seems reasonable to suggest that feedback's ability to promote belief-change was linked to interviewees' perception of feedback's credibility. Some interviewees explicitly pointed to its lack of credibility.

Perceptions of credibility are idiosyncratic to the learner, and depend on a myriad of factors. In the credibility literature, there are "a plethora of competing scales", most of which have never been reused or validated (West, 1994: 165), which makes it difficult to generalise to the literature. In this research, a basic issue for several of the learners interviewed was the anonymity of feedback's content. In theory, this deficiency could be easily rectified. The more problematic issue was the absence of cues by which interviewees could judge feedback's credibility and validity. A parallel issue faces Web-surfers, and has attracted recent attention by researchers (e.g. Burbules, 2001; Flanagin & Metzger, 2000). It is possible that findings from this field will provide insights into ways to resolve the related issue for e-learning feedback.

10.5 ACKNOWLEDGING THE INFLUENCE OF 'SELF'

My previous involvement with the professional services organisation, and the influence this might have on my role as researcher, need to be acknowledged for reasons which are explained in the next section. This is followed by a summary of my working experience and personal background which relate to this thesis. The chapter concludes by stating my assumptions regarding my relationship with interviewees.

This chapter complements Part 3 of this thesis, which discussed the methodological decisions relating to this research.

10.5.1 THE IMPORTANCE OF ACKNOWLEDGING 'SELF'

The processes by which a researcher conducts qualitative research - creating the conditions to collect the data, and later interpreting that data - are inextricably linked to the researcher's personal experiences and sense of self. During data collection, researchers and their 'objects' of research interact and influence each other in a process best described in the dynamic language of symbolic interactionism, rather than the static terms of the subject:object divide (Bryman, 1988). In the wider context of the research process, the influence of self extends even further. The researcher's personal experiences, and the framework of personal constructs which give meaning to those experiences, operate consciously and unconsciously: they guide decisions about where to focus one's attention, what questions to ask, and how to interpret data (Sword, 1999).

This view of self contrasts with the positivistic assumptions of the neutrality of the researcher, and of the belief of the early phenomenologists, led by Husserl, that it is possible to "bracket" one's assumptions and preconceptions. Husserl recognised in his later work (Solomon, 1970) that it is impossible to completely bracket one's preconceptions; nor is it completely possible to 'know' how one might be biased, although hindsight may reveal some insights. A reasonable compromise adopted by qualitative researchers is to explicate one's background and known assumptions to help the reader to understand the researcher's motivations and "context for interpretation" (Kvale, 1996). I have followed this reflexive tradition in the remainder of this section.

10.5.2 WORKING EXPERIENCE AND PERSONAL BACKGROUND

Prior to commencing this doctoral research, I had a varied career which exposed me to a number of different organisations, people and training systems - all of which shaped my interest in e-learning. After completing my undergraduate degree, I worked for nine years with one of the UK's largest commercial banks. As part of my own personal development, I then studied for an MBA qualification before working for six years as a management consultant in two different organisations. In my last position, I worked for four and a half years in the management consultancy practice of one of the 'Big 5' professional services organisations, first as a principal consultant and then during my last year as an instructional designer, developing an e-learning

application on the organisation's new project management methodology. My interest in the challenges of developing e-learning led me to decide to leave the organisation in order to pursue doctoral research.

Personal assumptions and "ways-of-knowing" (Belenky et al., 1997) are also shaped by interactions with one's family and social network, so it is appropriate to briefly mention something of this influence. Of particular relevance is the experience of my husband and several close friends who were (or are) employed at senior levels in different professional services firms. Conversations comparing experiences at these organisations enabled me to refine and develop my own assessment of the organisation's culture. These proved to be important when building rapport with interviewees.

10.5.3 ASSUMPTIONS REGARDING INTERVIEWEES

Decisions regarding the appropriate empirical setting, data collection methods and materials, were based on several assumptions about the interviewees and their likely responses to interview questions. These assumptions were that -

- My prior experience in the organisation gave me knowledge of the common terms, metaphors and organisational jargon used by interviewees in relating to their workplace context. This inter-subjective understanding would help me to interpret interviewees' remarks with the meaning that was intended.
- I could create a supportive environment where interviewees would offer honest and considered comments.
- Interviewees would accept my stated commitment to confidentiality, and would therefore give candid answers to my questions.
- On completion of pilot studies, questions would be comprehensible to interviewees.

10.6 CRITIQUE OF THE DESIGN AND CONDUCT OF THE RESEARCH

This section presents a reflective critique which allows for discussion of lessons learned about the design and conduct of research.

10.6.1 ISSUES RELATING TO MYSELF AS PRIMARY RESEARCHER

The life of a doctoral researcher has been described as one of fevered isolation in a quest to extend the boundaries of one's field (Phillips & Pugh, 1994). From my own perspective, this isolation potentially posed the greatest problems during the analysis phases of research. Tentative ideas and insights usually benefit from informal discussion with colleagues who share an interest and detailed familiarity with the data. This is an informal and lengthy process which should not be the burden of the doctoral supervisor, who has different responsibilities.

I was acutely aware of this problem, and actively sought to mitigate its effect. In particular, I worked to build relationships with fellow students in related fields at my own and other universities. We shared experiences and progress, and gave informal guidance and critiques of each others' work. Through this extended network, as well as my attendance at academic conferences, I tried to ensure my openness to alternative perspectives relating to my research topic, and avoid the blinkers of working too frequently in isolation.

10.6.2 SAMPLING ISSUES

Having worked in the professional services firm from which I wished to draw my sample, I had a privileged position which facilitated access. In studies 1, 2 and 3, training administrators and resource managers identified time-based samples of candidates who had recently completed the target e-learning applications, and who varied in level-of-expertise. In study 4, resource managers aimed to identify a sample of candidates who were available for face-to-face interview in London, and who were either novices or experts. Levels-of-expertise in the latter sample were in practice more spread than intended, giving less of a distinction between novices and experts with which to test study 4's hypotheses.

Samples were originally to be drawn from another professional services firm to enable cross-organisational comparisons, and enhance generalisability of findings. However, it was not possible to negotiate access to the second organisation once it became engrossed in merger talks. Study 3 compensated to some extent by drawing interviewees not only from the consulting practice (the sampling frame for studies 1, 2 and 4), but also the audit and support units, thereby enabling *within*-organisation comparisons to be made.

10.6.3 ISSUES RELATING TO DATA COLLECTION METHODS

Studies 1, 2 and 3 explored learners' retrospective accounts of previous e-learning experiences, and their reflections on those experiences. The quasi-experimental nature of study 4 meant that interviewees could be observed as well as interviewed whilst they completed a storyboard of

prototype feedback designs. Nevertheless, the research design emphasised interviews and recollections of experiences, as opposed to observation and real-time experiences.

Reflecting on the implementation of this design, I would make two comments. Firstly, the contrast between learners' recollections and real-time experiences provided a means of triangulating the data which facilitated a more comprehensive understanding of learners' experiences. Learners' *recollections* were of authentic experiences, and gave insights into the importance of contextual influences such as styles-of-engagement and sense-of-inquiry. On the other hand, learners' *real-time experiences* in an quasi-experimental setting were more vividly expressed, and could be probed and amplified, yet were limited to non-naturalistic context. Secondly, it became apparent during interviews that few learners had a clearly-articulated definition and interpretation of their expectations of e-learning feedback. I was aware that to some extent, their conceptualisations of feedback were being constructed through the dialogue of the interview. This heightened my responsibility to avoid leading the discussions in directions indicated by previous interviewees. I also avoided using the terminology of second-order concepts, such as 'instructional function', not only to avoid confusing interviewees but also to avoid prejudicing their developing constructions of the nature of e-learning feedback.

10.6.4 DATA ANALYSIS ISSUES

This study produced a large amount of textual data from the seventy-two interviews. From a data management perspective, the choice of NVivo proved to be invaluable. However, as an analytic tool, I also saw its constraints and limitations. In particular, although it facilitated the process of "first-level coding" (Miles & Huberman, 1994), and enabled sophisticated searches and queries to be performed, its linear format inhibited progress towards a more holistic reading of the data.

I also found that analysis of codes from within NVivo lost sight of the contextual meaning, in spite of the oft-quoted mantra that NVivo allows swift switching between *coded* text and the text *within* the transcript. To overcome this deficiency, I expanded my range of analytic tools and techniques to allow me to make sense of both detail and context, as well as learners' idiosyncratic and shared patterns of experiences of e-learning feedback. Use of NVivo was supplemented with the concept-mapping functionality of MindManager, the spreadsheet capabilities of Microsoft Excel (to support numerical analysis of interactions), as well as manual re-reading and interpretation of the transcripts.

10.7 GENERALISABILITY

There are limitations to the statistical generalisability of this research, given that the sampling frame was based in a single organisation. Nor would it be sensible to generalise within the industry: Morris and Empson (1998) have already pointed to substantive differences between consulting practices, from which most of the respondents were drawn.

Without statistical generalisability, a question arises about the significance of this research? How can it be used? To answer this question, I refer to alternative conceptions of generalisability proposed in the methodology literature: theoretical and case-to-case (Kvale 1996; Firestone, 1993; Mason, 1996).

Theoretical generalisability is the claim that concepts, themes and patterns observed in one setting have the power to describe and explain observations in other settings. I would argue that the conceptual framework developed from this study potentially has a wider applicability to other business learners and their experiences of e-learning feedback. With adaptations, it may also be useful in feedback studies which accompany the growing CAA (computer assisted assessment) research programs.

Case-to-case generalisation involves a reasoned judgement about the extent to which findings from one study can be used as a guide to what might occur in another situation. For example, the analysis of findings may raise questions, suggests implications and generates insights which might offer lessons for other settings (Mason, 1996: 154; Kvale, 1996: 233; Walsham, 1995). If researchers are as explicit as possible about the source data – the characteristics of the sample, the scope and boundaries of the study, known limits to generalisability etc. – and if theses are richly descriptive of the findings, readers can more easily assess the potential transferability of findings (Miles & Huberman, 1994: 279). In this thesis, I have tried to support readers looking for case-to-case generalisation by presenting contextualising information on the interviewee samples and source e-learning materials, to enable readers to draw conclusions for their local empirical settings.

10.8 SUGGESTIONS FOR FURTHER RESEARCH

Three aspects of the research findings offer fruitful avenues for further research: development of the conceptual framework; investigation of the efficacy of adaptive e-learning feedback; and strategies to improve the perceived credibility of feedback.

10.8.1 DEVELOPING THE CONCEPTUAL FRAMEWORK

The conceptual framework is proposed as a heuristic tool to help explain learners' expectations and responses to e-learning feedback. In future research, the robustness of the framework could be developed using samples and settings which resemble those of this research. Alternatively, the generalisability of the framework could be investigated in different empirical settings. Ultimately, the objective in doing so would be to explore the utility of the framework as a heuristic device, and for these purposes, further research on the efficacy of adaptive feedback could be particularly important, as discussed next.

10.8.2 INVESTIGATING THE EFFICACY OF ADAPTIVE E-LEARNING FEEDBACK

Findings relating to apparent differences in the way learners of different levels-of-expertise experienced e-learning feedback lead to the recommendation for adaptive feedback. Study 4 tested some of the hypotheses derived from the earlier studies by constructing comparative feedback examples which were then presented to learners for comment. More empirical work of this nature - either using storyboard examples or authentic examples from real applications - would contribute to an investigation of the efficacy of adaptive e-learning feedback.

This line of research may benefit from incorporating findings from prior research on adaptive feedback, particularly the work on response certitude (Kulhavy & Stock, 1989; Davies, 2002). The latter research indicated that learners' expectations of feedback are influenced by their "response certitude", i.e. their self assessment of the likelihood that they answered the task correctly. This finding was not incorporated in this research, because the e-learning applications did not allow learners to record their response certitude with each task. However, such functionality could be incorporated into new e-learning applications investigated in future research. This would allow for an investigation of the combined influence of response certitude and level-of-expertise on learners' expectations of, and responses to feedback.

10.8.3 ENHANCING FEEDBACK'S PERCEIVED CREDIBILITY

It was argued previously that learners' outcomes on receiving feedback are a product of interactions between four factors: learners' expectations of feedback (influenced by styles-of-engagement, sense of inquiry, and generic expectations of feedback); the attributes of the feedback received; the learners' sense of confidence in the validity in their existing knowledge; and the perceived credibility of the feedback. Findings indicated several ways in which credibility was 'lost', prompting learners to doubt the validity of the feedback and in some cases to dismiss it.

An important area for further research would be to investigate ways to improve the perceived credibility of feedback. An underlying assumption would be that with more credible feedback, learners would be more mindful about reflecting on the feedback, and would be more open to apparently anomalous information.

Current research on the credibility of web-based information (e.g. Burbules, 2001; Flanagin & Metzger, 2000) may provide insights which can guide a related line of research within the educational field. However, a more promising line of research may involve investigating the benefits of supplementing programmed feedback embedded in e-learning applications with dynamic feedback. For example, dynamic feedback could be initiated in at least two ways: via email with instructors, or via access to online discussion forums with colleagues as well as instructors. By supplementing programmed feedback with dynamic feedback, learners could discuss concerns, hear evidence and illustrative stories which support or contradict the programmed feedback, and thereby construct new interpretations of the instructional message. By doing so, learners may be more likely to re-consider the validity of the feedback and make at least peripheral changes to existing beliefs, rather than dismiss the feedback outright.

This avenue of further research would represent a progression of Chinn and Brewer's (1993) important research on the responses of science students to anomalous data which contradicted their existing beliefs and theories, and their tendency to dismiss anomalous data in order to protect the sanctity of existing beliefs. In the context of science teaching in schools, Chinn and Brewer suggested ways in which teaching could make theory-change more likely, and the dismissal of anomalous data less likely. Their findings may also be relevant to the context of business e-learners who are developing problem-solving skills. Further research is recommended to investigate ways to enhance the perceived credibility of feedback for this group of learners.

10.9 CONCLUDING REMARKS

The findings from this research exposed deficiencies in the theories of feedback which currently inform e-learning feedback design. By looking at feedback from the perspective of the learner, the function of feedback was identified as that of enabling learners to achieve a sense of closure to the immediately-completed task, through an appropriate combination of feedback's instructional function, epistemic perspective, content and contextualisation.

It was further argued that the instructional function, which is usually the focus in learning theories, is merely a means to an end, where that 'end' is closure. This re-conceptualisation of the function of feedback implies an associated need to re-consider the pedagogy of e-learning feedback design. To this end, a conceptual framework was proposed to represent learners' experiences of, and responses to e-learning feedback. However, further work would be needed to develop and extend the framework. The importance of adapting feedback to the expectations of the learner, and in particular to their level-of-expertise, was also suggested by the research findings.

The continued drive by many organisations in the corporate sector to extend training into the e-learning arena, and the importance of feedback to the learning process, point to the importance and significance of this research and its contribution to the development of an e-learning pedagogy. The need for more research is especially important given current complaints about the lack of added-value in many e-learning applications targetting the business market (Taylor, 2002; Barron, 2002; Powell, 2003; Brodsky, 2003). This thesis contributes to the need for more e-learning research by exposing deficiencies in the design of feedback, and by suggesting ways to improve feedback to make it more useful and meaningful to the learner.

PART SIX

APPENDICES AND REFERENCES

APPENDIX A
EXAMPLE EMAIL FROM ORGANISATION TO INTERVIEW CANDIDATES

Dear colleagues,

A few days from now you will receive a call from Karen Handley, requesting an interview about your evaluation of the activities in *'Zentoria: Introduction to [organisation's name] approach to PPM'*. I am writing in advance because we've found that many people like to know ahead of time that they will be contacted, and why.

The study is being conducted by Karen Handley, a doctoral student at Imperial College, London, with support from [organisation's name] Learning and Professional Development group. The purpose of the study is to understand how learners evaluate the activities in CD-ROM training programs, such as *Zentoria*, and to find out what they would like in the future.

Your comments and suggestions are very important to us.

Regards,

[Name]

If you would like more information about this study, please contact Karen Handley at karen.handley@ic.ac.uk or on (44) 1992 700031.

APPENDIX B: INTERVIEW GUIDE FOR STUDY 1

	[Opening comments]
INTRO	**Introducing the purpose of the interview**
	Thank you for agreeing to take part in this research. The purpose of the research is to find out people's views about the activities within CD-ROM applications such as *Zentoria*, and in particular, to find out what they think of the feedback. The reason for this interview is to ask for *your* impressions of the feedback, and to find out how feedback can be improved in future e-learning applications. Your comments will be confidential. For accuracy, may I record the interview?
PART A	**Level-of-expertise and other attributes**
	Can you please tell me your organisational grade.
	How long have you worked at [organisation's name]?
	Please can you tell me your age, using an age range such as 26-30 or 41-45
PART B	**Objectives and general comments about the e-learning application**
	What were your overall impressions of the application?
	What were your reasons for doing the training?
	Was the training what you'd expected?

PART C	**Comments on three activities included in the e-learning application**	
	I'd like to ask about your opinions about the style and quality of the feedback in Zentoria. I'm particularly interested in the feedback for activities relating to the Intellis Project case-study, where you took on the role of project manager. The activities typically presented a business problem, and you were asked to type your response into the Scratchpad; afterwards you received feedback. I'd like to ask your opinions about each of the 3 specific feedback examples, and these are shown in the screenprints which I sent you earlier [Check that the interviewee has these] [NOTE: For each example, refer to the interview questions in the right-hand column. Adapt if appropriate]	
Ex. 1	[*Introduction to example 1*] The activity on page 1 asks you to give advice to your team leader, Karl Zingg, who has fallen into the trap of scope creep. The feedback is shown on page 2.	<u>General questions</u> What were your overall impressions of this activity? What did you think of the feedback? (prompt for comments on style and content) What made the feedback useful? What would have made the feedback more useful? Are there ways the feedback could be improved? Did you feel anything was missing from the feedback? Was the feedback pitched at the right level / appropriate for your level of expertise? <u>Rating of usefulness</u> (for each example) How would you rate the usefulness of this particular feedback on a scale of 1-5, where … 1 = not at all useful 2 = not useful 3 = slightly useful 4 = useful 5 = very useful
Ex. 2	[*Introduction to example 2*] The activity on page 3 concerns a team leader who is completing a status report for the [organisation's name] key review. She has identified some problems, completed part of the report, and now asks you to help her write the two blank sections. The feedback on page 4 effectively 'fills in' those 2 blank sections.	
Ex. 3	[*Introduction to example 3*] This activity is about the project kick-off meeting. As project manager, you're asked what questions you think your team will have, and what things you'll say at the meeting. The feedback is shown on page 6.	
Comparison question	Thinking back to all three feedback examples, which did you prefer? Why?	

PART D	Definition of 'useful', and their comments on broader issues
	In this last section, I'd like to ask your opinions about how we can improve feedback within computer-based training programs such as Zentoria.
'Useful'	Overall, for the type of activities you completed in Zentoria, what makes feedback useful?
Nine hypothetical designs	Thinking hypothetically now, I'd like to present 3 scenarios, each with different types of CBT feedback, and then ask what you think of them. All scenarios involve the type of activity we've been talking about, where you are presented with a managerial problem such as how to handle scope creep, and you're asked an open question, such as "what would you do in this situation?", and then you write your response into a Scratchpad.
Set 1	The first scenario compares 3 types of text feedback. I'll read out all of the feedback options, first. The options are where you are given … • A 'model answer' • Key do's and don'ts • Several real-life examples, each describing a project situation, the intervention, and the outcome Would any of those be useful?
Set 2	The second scenario also compares 3 types of text feedback. The 3 options are where the feedback … • Describes the formal, best practice intervention • Explains the underlying issues behind the problem • Describes how an expert would think through the problem. Would any of those be useful?
Set 3	The third scenario is different in that video is used in the feedback. The 3 options are where the video allows you to … • See the consequences of several problem interventions • See an expert comparing the pros and cons of several problem interventions • See peers in an informal setting debating the merits of several problem interventions Would any of those be useful?
Number of e-learning apps.	How many e-learning applications have you completed in the past? Were they any which you particularly enjoyed or did not like?
E-learning	What do you think are the advantages and disadvantages of e-learning?
Closing question	Do you have any other comments you'd like to make, about feedback or about e-learning in general?
	[CLOSING COMMENTS]

Appendix C: Introductions to activity examples in studies 2 & 3

Introduction to activities used in study 2 (Coaching Advantage)

Example	Verbal description from interviewer
CA1	"The exercise presents a video clip showing a coach trying out the skill of advocacy. You are asked to determine whether the coach was effective or not, and - if you believe he was ineffective - which aspect was ineffective. "The feedback I have selected for this example is shown on page 2, and is based on the assumption that you answered 'Ineffective, because he used the word *frustrated'* which was an incorrect answer.
CA2	"In this example, your protégé has come to you for a coaching session, and you are asked to have a problem-solving conversation with him to determine the problem, cause and solution. After watching a video of the protégé talking, you are asked to select a statement you would use to respond to him. "The text feedback selected for this example is shown at the top of page 3, based on the assumption that you selected option B, which was incorrect. You also see a video of the consequences of your selected option. You are then re-presented with the response options. "The text feedback at the bottom of page 3 assumes that you chose option A, which was correct. You also see a video of the consequences of that option. "This activity contains ten steps involving a similar sequences to the one I've just described."
CA3	"The task presents a scenario which involves your protégé, who has completed a self-assessment profile which is higher than you think he can demonstrate. You are asked to click one of the checkboxes to show how you'd respond. "The text feedback on page 5 assumes that you chose the response 'insist that the protégé change his performance assessment', which was incorrect."

Introduction to activities used in study 3 (Navigating the Grey)

Example	Verbal description from interviewer
NtG1	"Lucy is working with Randy to prepare an e-business proposal for Tech.com. Lucy has recently joined the firm from W&H, which is the competitor in this bid. Randy asks Lucy for information about W&H such as pricing and staffing strategies. "You were asked to chose how you think Lucy should have responded. The feedback shown on page 2 assumes you selected option (2), which was correct. In the feedback, you saw a video of the conversation, and text saying "That's right: Lucy and Randy should get an expert opinion."
NtG2	"The firm has won the Tech.com work. Lucy can't be fully involved on the project because of other client commitments. "The activity asks you to chose how Randy, the project manager, should respond. The correct option was (1); however, the feedback on page 4 assumes that you chose option (2) which was incorrect. The screenprints show the end of the video sequence where the client says that Lucy's involvement is critical, and without her Tech.com don't want to award the contract to the firm. You also see the feedback text for option 2, which asks you to 'try again'. "The feedback on page 5 assumes that you then selected option (3). This includes text and a video of Randy telling Lucy that he won't tell the client yet that Lucy has other commitments. Then, the feedback rolls into another scenario and a new task, where the problem surfaces again because Lucy is called to the first client meeting, but may be unable to attend. You're again asked to chose how you think Randy should respond, and you get more feedback. The correct response was option (3). However, the feedback on page 7 assumes you selected option (1), which was incorrect. The feedback asks you to try again. The feedback on page 8 assumes you then selected option (3).
NtG3	"Kevin is a PM working with Phil, who is from the client. They've built up a good friendship. Phil manages to get four tickets to the basketball game, and asks if Kevin would like to come. "The activity on page 10 asks you to chose how Kevin should respond. The correct option was (1). The screenprints show the feedback if you had selected either of the incorrect options, option (2) on page 11, and option (3) on page 12."

Appendix D: Interview guide for Study 4

	[Opening comments]
Intro	**Introducing the purpose of the interview**
	Thank you for agreeing to take part in this research. The purpose of the research is to find out people's views about e-learning applications designed to develop their problem-solving skills in areas such as project management. In particular, the research is looking at people's views on the activities they do as part of the training, and the feedback they receive after completing the activities. I have 5 examples to show you, each of which includes a background scenario, question and feedback. Some have video and audio as well as text. These are not supposed to be ideals - they are just different styles. I'd like you to look at each activity and imagine you are completing it as part of your training. So for example, if the question is a MCQ, I'd like you to select your preferred answer because in that way I can show you what type of feedback you would have received if you'd be doing this for real. I'm especially interested in your options of the feedback - how useful it is, and what you think of the style and the content. This is NOT a test, and I'm not checking your answers. Your comments will be confidential. For accuracy, may I record the interview?
Part A	**Level-of-expertise and other attributes**
	Can you please tell me your organisational grade.
	How long have you worked at [organisation's name]?
	Please can you tell me your age, using an age range such as 26-30 or 41-45

Part C	**Comments on five activities**
Example 1	
	The first example is from *Zentoria*, which is an introduction to [organisation's name] project management methodology. The scenario is based on a software implementation project, in which the client in building an electronic car. If you were taking this training, your role would be as project manager. Karl Zingg is one of your team leaders. The first screen explains the background scenario and the problem. You're then asked to use the computer Scratchpad to type your answer. SHOW OPEN QUESTION #1
	How would you have replied to that? [Probe: For example, would you use the Scratchpad to type a response into the computer?, or a pad of paper, or would you think things through in your head?]
	I'll now show you the same question in a different format SHOW MCQ #2
	Which of the three options would you have chosen? — OPTION =
	At this point, before receiving feedback, which question format do you prefer?
	Here's the feedback you would have received for the first question format you looked at. SHOW MA FB #3
	[REFER TO QUESTION SHEET]
	This is the feedback you would have received for the second question format, where you chose answer XXX. [RETURN TO SLIDE #2, THEN FORWARD TO APPROPRIATE SLIDE #4, #5 OR #6]
	[REFER TO QUESTION SHEET] *THEN* Which style of feedback did you prefer and why? Comparing the two types of activity - i.e. considering both the question and the feedback - which type did you prefer and why?
Example 2	
	The next example is from an introductory course about business ethics. The scenario is introduced by showing you photos of the people involved, and giving a summary of the background scenario. If you were doing this course, you'd be taking the role of Kevin, who is a team member on a project. Once again, I'm interested in your opinions about the design of the activity, and particularly the feedback. Here is the background scenario, presented as still photos and a voice-over SHOW SCENARIO #7 You're then presented with this ethical dilemma, shown here. SHOW TASK #8
	Which of the three options would you have chosen? — OPTION =
	I'll now show you two styles of feedback, and I'm interested in your opinions about how useful they are. SHOW FEEDBACK #9 (MULTIPLE PERSPECTIVES)

[REFER TO QUESTION SHEET] *THEN* -

How useful is it to get different people's perspectives, rather than a single answer?

Some people have said they prefer to hear about other people's opinions, and other people's experiences of dealing with a problem. What's your opinion?

Here is an alternative style of feedback, in response to option XXX which you chose earlier

FIRST GO TO SLIDE #8, THEN APPROPRIATE FEEDBACK (#10, #11 or #12)

[REFER TO QUESTION SHEET] *THEN* -

Which type of feedback did you prefer and why?

Example 3

This is another example from the project management course. If you were doing this course, you'd be taking the role of project manager, planning for a project kick-off meeting for your staff of 3 team leaders, and 6 team members. The next screen shows you your task, and I'd like you to think about how you'd complete it.

SHOW TASK #13

I'll now show you 2 styles of feedback

SHOW FEEDBACK #14 and #15

[REFER TO QUESTION SHEET] *THEN* -

Which type of feedback did you prefer and why?

Example 4

This is taken from the Business Ethics CBT you saw earlier. If you were doing this CBT, you'd have taken the role of Steve, who is a team leader. A colleague of Steve from another project comes to him with an ethical dilemma to do with racism.

SHOW STILL+AUDIO clip

In the next audio clip, Sheila asks Steve for some advice

SHOW VIDEO

The next slide shows three ways that Steve could respond.

SHOW STILL PHOTO

Which of the three options would you have chosen?	OPTION =

I'll show the feedback, which shows the consequences of that option.

SHOW APPROPRIATE FEEDBACK

[REFER TO QUESTION SHEET]

I'd now like to show an additional piece of feedback

SHOW FEEDBACK

[REFER TO QUESTION SHEET] *THEN*

Which type of feedback did you prefer and why?

Would it have been enough just to see the video without the text?

Example 5

In this example is from some web-based training which introduced coaching and mentoring skills. If you were doing this program you'd be taking the role of coach.

SHOW TASK

Which of the five options would you have chosen?	OPTION =

SHOW APPROPRIATE FEEDBACK

[REFER TO QUESTION SHEET]

To what extent do you feel you understand why each of the other options was incorrect?

If there were an option to see feedback for all the other options, how useful would that be?

Would you use it?

QUESTION SHEET FOR USE WITH ALL EXAMPLES	
General questions [adapt where relevant]	Rating of usefulness
How useful is this feedback? (prompt for comments on style and content)	How would you rate the usefulness of the feedback on a scale of 1-5, where …
What made the feedback useful?	1 = not at all useful 2 = not useful 3 = slightly useful 4 = useful 5 = very useful
What would have made the feedback more useful?	
Are there ways the feedback could be improved?	
Was the feedback pitched at the right level / appropriate for your level of expertise?	

PART D	Definition of 'useful', and their comments on broader issues
	In this last section, I'd like to ask your opinions about how we can improve feedback within e-learning applications.
	Overall, for the type of activities you've just completed, what makes feedback useful?
	How many e-learning applications have you completed in the past? Were they any which you particularly enjoyed or did not like?
	What do you think are the advantages and disadvantages of e-learning?
	Do you have any other comments you'd like to make, about feedback or about e-learning in general?
	[CLOSING COMMENTS]

Appendix E: Screenprints for Study 1 (Zentoria)

The following screenprints show three example activities taken from *Zentoria*. These examples will be discussed during our interview. Each example shows the task screens followed by the feedback screens.

EXAMPLE ZEN1

Task

ZENTOR: "You've got mail from Karl Zingg, one of your team leaders, following his meeting with Sipho Nogata".

From: Karl Zingg
Subject: Scope Key Review
Attachments: none

My team had a very interesting meeting with Sipho Nogata last week. We reviewed the requirements for the 'parts' order routing software, and the draft short list of software vendors.

Our meeting brought out some new ideas about re-engineering the sales > production process. We talked about a scenario where sales orders feed directly into a parts order routing process, bringing Intellis closer to its goal of Just-In-Time production. Sipho asked us to extend our search to include fully integrated sales > production software.

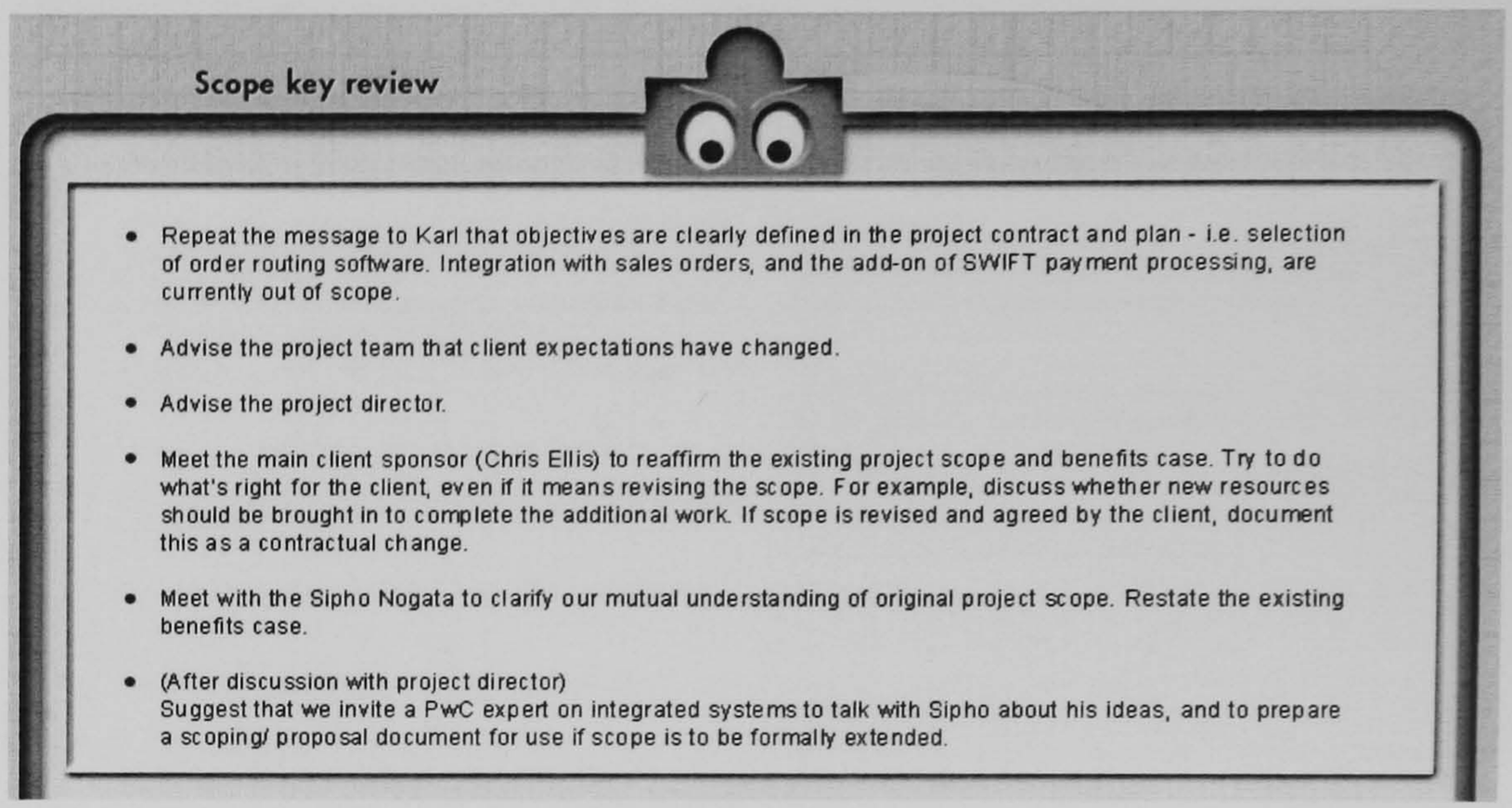
Sipho also wanted to extend the requirements document to include automated SWIFT (electronic) payment to parts manufacturers. As a result one of my team is re-looking at software options to find software vendors which meet these additional requirements.

ZENTOR: "How are you planning to respond to this email? It looks like your team leader might be falling into the trap of scope-creep. What advice would you give him? Use the Scratchpad to make your notes."



Feedback for example ZEN1

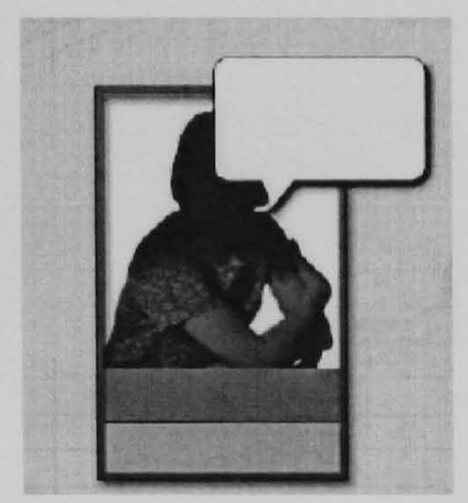
ZENTOR: "Here are some action points I'd suggest. But do remember, only project managers and project directors should re-negotiate scope changes".



EXAMPLE ZEN2

TASK

ZENTOR: "Here comes one of your team leaders, and she doesn't look happy. She's been working on the status report for the [name of organisation] key".



TEAM LEADER: "I'm really quite concerned about this review. Joseph Middleton, one of the [name of organisation] stakeholders in Johannesburg, has expressed doubts in partner meetings about the calibre of our team. Can we work together on identifying some recommended actions for this report?"

ZENTOR: "Here's what she has completed so far. Use the Scratchpad to complete it".

PwC key review

DESCRIPTION OF AN ACTIVITY	ANALYSIS AND RECOMMENDATIONS
Assess current status of PwC stakeholder management against the objectives for this process, as set out in the process definitions. Refer to the process definitions for information on the monitoring and measurement methods.	Assessment Assessment reveals that support from Joseph Middleton, a senior partner from the Consumer and Industrial Products practice in Johannesburg, is declining.
Assess the overall impact of the current PwC stakeholder position. Assess how significant the current position is. Identify the underlying reasons why any variation to plan has occurred.	Assessment Without the continued support of Joseph Middleton, the project reputation will suffer significantly. This is a serious risk. Underlying cause: may be due to lack of communication between the Intellis project team and Joseph Middleton: he has been working in Europe for 3 months, and no contact has been made with him so far.
Recommend actions for PwC stakeholder management.	?
Improve PwC stakeholder management process.	?

FEEDBACK FOR ZEN2

ZENTOR: "This is what she filled out in the end".

PwC key review

DESCRIPTION OF AN ACTIVITY	ANALYSIS AND RECOMMENDATIONS
Assess current status of PwC stakeholder management against the objectives for this process, as set out in the process definitions. Refer to the process definitions for information on the monitoring and measurement methods.	Assessment Assessment reveals that support from Joseph Middleton, a senior partner from the Consumer and Industrial Products practice in Johannesburg, is declining.
Assess the overall impact of the current PwC stakeholder position. Assess how significant the current position is. Identify the underlying reasons why any variation to plan has occurred.	Assessment Without the continued support of Joseph Middleton, the project reputation will suffer significantly. This is a serious risk. Underlying cause: may be due to lack of communication between the Intellis project team and Joseph Middleton: he has been working in Europe for 3 months, and no contact has been made with him so far.
Recommend actions for PwC stakeholder management.	Following discussions between the project manager and Bill Cohen (project director), Bill will meet Joseph Middleton to discuss his concerns.
Improve PwC stakeholder management process.	The PwC stakeholder management process has been updated to include a formal monthly conference call between the PwC stakeholders and Bill Cohen.

EXAMPLE ZEN3

TASK

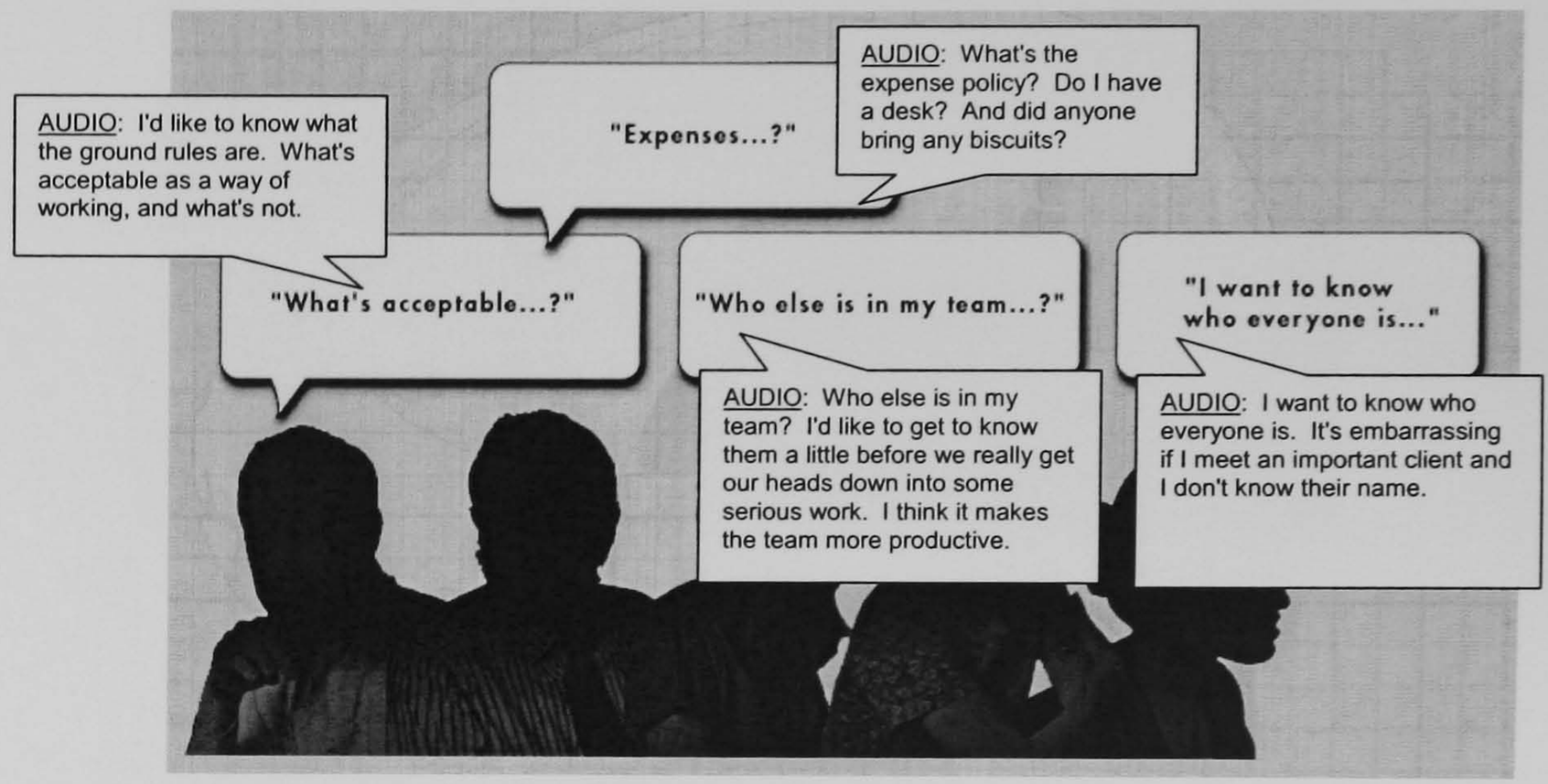
ZENTOR: "The project kick-off meeting is about to start. This is your chance to orientate the team with background information, and introduce a spirit of positive team-working. They'll be full of questions, I'm sure, so it's best to be prepared.

"If you were in their shoes right now, what sort of questions would you ask? Jot them down in the Scratchpad".



FEEDBACK FOR ZEN3

ZENTOR: "Yes, all very salient points. But do you want to know what I overhead in the corridor outside? Listen to this!"



ZENTOR: "As I said, they are full of questions. Good luck!"

Appendix F: Screenprints for Study 2 (Coaching Advantage)

The following screenprints show three example activities taken from *Coaching Advantage*. These examples will be discussed during our interview. The screenprints may not show precisely the feedback you received, but are typical of the style of feedback provided in this training program. For each example, both the task and feedback screens are shown.

EXAMPLE CA1

Task

Advocacy: Quiz

Part 3:
Question 1

View the video clip of advocacy guidelines in action. For the clip, determine if the advocacy was effective OR ineffective. If the advocacy was ineffective, identify what was ineffective about the advocacy.

Video Clip No. 1: View Video | Listen to Audio

- ○ Effective
- ◉ Ineffective

Please verify your answe
not be able to change yo
"Submit".

Continue

Advocacy - Microsoft Internet Ex...

What was ineffective?

- ● A. Using the word frustrated
- ○ B. Stating the advocacy decisively
- ○ C. Offering advice to the protege

Feedback for CA1

Part 3 Results

You were asked to determine if the advocacy was effective OR ineffective. If the advocacy was ineffective, you were then asked to identify what was ineffective about the advocacy.

Video Clip 1

You answered: Ineffective
Correct!

You identified as ineffective: A. Using the word "frustrated".
. Incorrect! No, acknowledgement of the protégé's frustration legitimises his/her present state. (Advocacy Guidelines: 1) Acknowledge the Protégé's Situation, Video Clip No. 1)

EXAMPLE CA2

TASK

Explore the Territory Quiz:

Part 3

Scenario:
A project manager for whom you are the coach comes to a coaching session with a presenting issue (see video clip)

Characters:
You are the coach. Lee Chow is your protégé, a project manager.

Off-screen Characters:
John, Partner
Sandra, Programme Manager

Directions:
Have a problem-solving conversation with this protégé to help ascertain the problem, root cause(s) and solution.

Process:

You will be given two possible choices for each conversational turn. Once you have made your selection of the best choice (based on the feedback steps), you will be advised as to whether you made the recommended selection. If you did, you will be given that feedback and then you will see the video protégé's response and move to the next choice point. If you did not make the recommended selection, you will likewise receive feedback and then see the impact your selection had on the video protégé. At that time, you will be returned to the choice point and allowed to re-select the recommended alternative.

Please, note: This feedback will not be repeated on the final results page.

View Video | Listen to Audio

Question 1

Given what you already know about the situation, which of the following would you say?

- A. What would you like to get out of our conversation today?
- B. Sounds like a lot is up. What do you think is behind all this?

FEEDBACK FOR EXAMPLE CA2

Part 3: Question 1

You are using the Inquiry Technique, "probing questions;" however, you have gone further into the conversation without knowing what the protégé wants from you, which is always the first step. Let's see what happens in response. (Coaching Conversation, Video Clip)

View Video | Listen to Audio

REPEAT OF THE TASK

Part 3: Question 1

Step 1: Given what you already know about the situation, which of the following would you say?

- (•) A) What would you like to get out of our conversation today?
- ( ) B) Sounds like a lot is up. What do you think is behind all this?

REVISED FEEDBACK FOR CA2

Part 3: Question 1

It is always a good first step to create a contract with your protégé about what they want to produce in the coaching conversation. Let's see what happens in response.

View Video | Listen to Audio

EXAMPLE CA3

TASK

Part 5

Directions:
You will see several case scenarios. These scenarios and the questions that follow each were developed to test your ability to apply the principles of evaluation to the annual assessment process. After each case, check which of the responses is most appropriate.

Scenario 1: You don't agree with your protégé's self-assessed profile; it is higher than what you feel he can demonstrate. He seems somewhat defensive, and you think he might be resistant to an alternative point of view. What do you do?

- ( ) Try to understand the protégé's perspective before doing anything else.
- ( ) Don't say anything. Discuss the matter with the protégé after he gets his results because he will be more open.
- (•) Insist that the protégé change his performance assessment.
- ( ) Educate him about the process and what's really required.
- ( ) Skip this question.

FEEDBACK

Question 5 Results:
14.12A Evaluate the Impact: Quiz #5

Scenario 1: You don't agree with your protégé's self-assessed profile; it is higher than what you feel he can demonstrate. He seems somewhat defensive, and you think he might be resistant to an alternative point of view. What do you do?

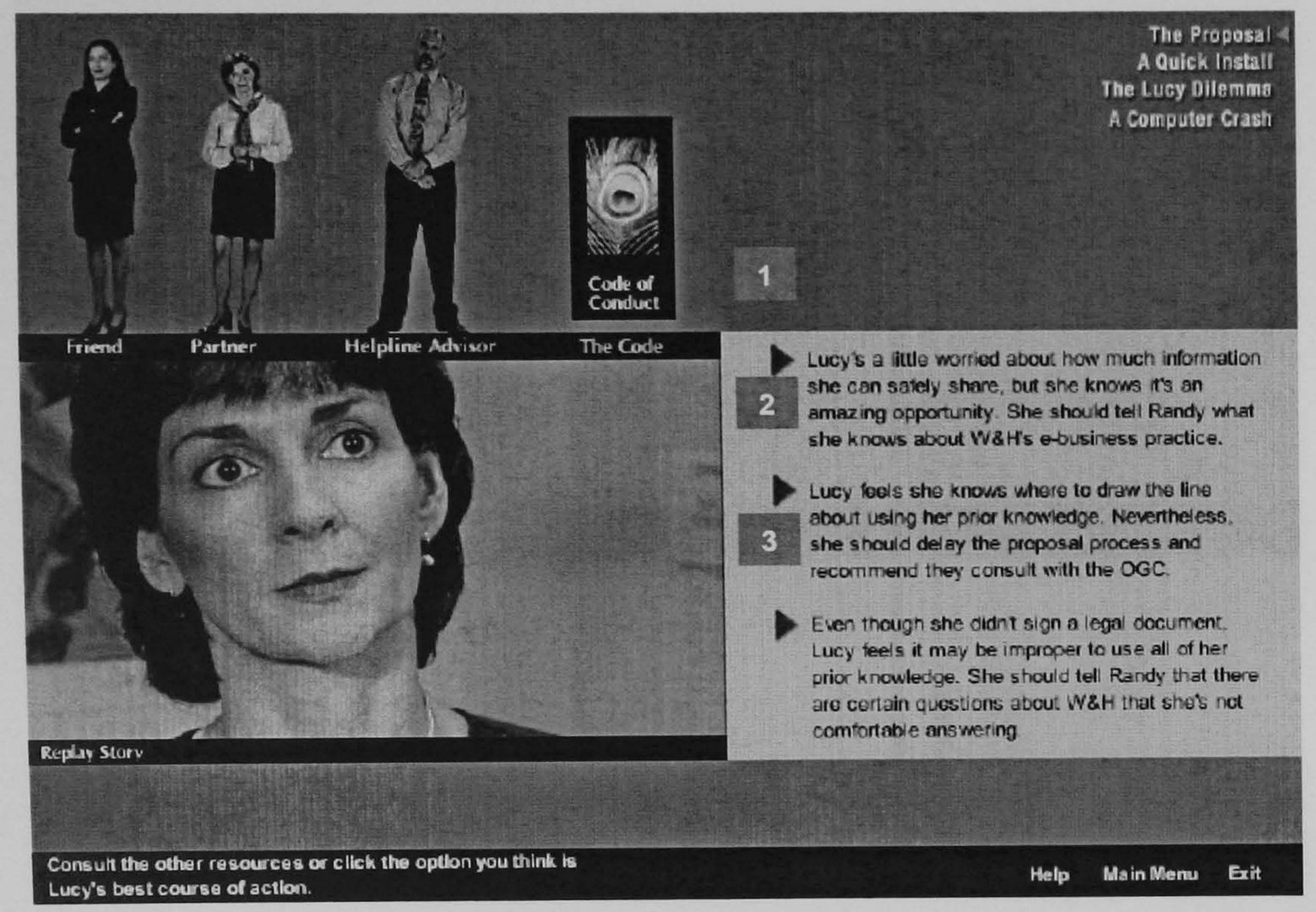
c)Insist that the protégé change his performance assessment. Incorrect. Some revision of the assessment might be useful, but the first step is to inquire, especially if the protégé seems defensive. (Annual Assessment: An Overview - Protégés May Make One of Two Mistakes)

Appendix G: Screenprints for Study 3 (Navigating the Grey)

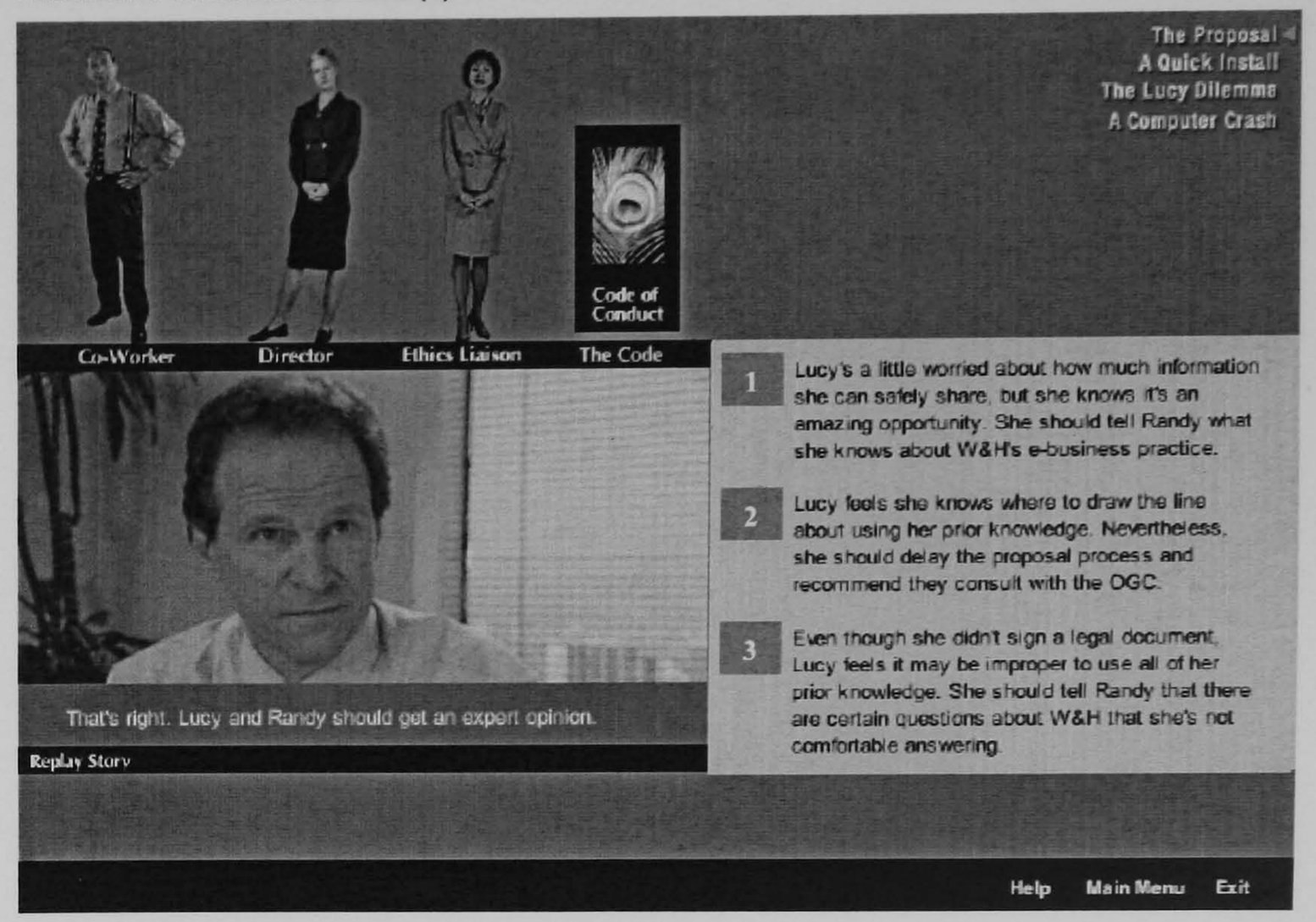
The following screenprints show three example activities taken from *Coaching Advantage*. These examples will be discussed during our interview. The screenprints may not show precisely the feedback you received, but are typical of the style of feedback provided in this training program. For each example, both the task and feedback screens are shown.

EXAMPLE NTG1 - THE PROPOSAL

Task

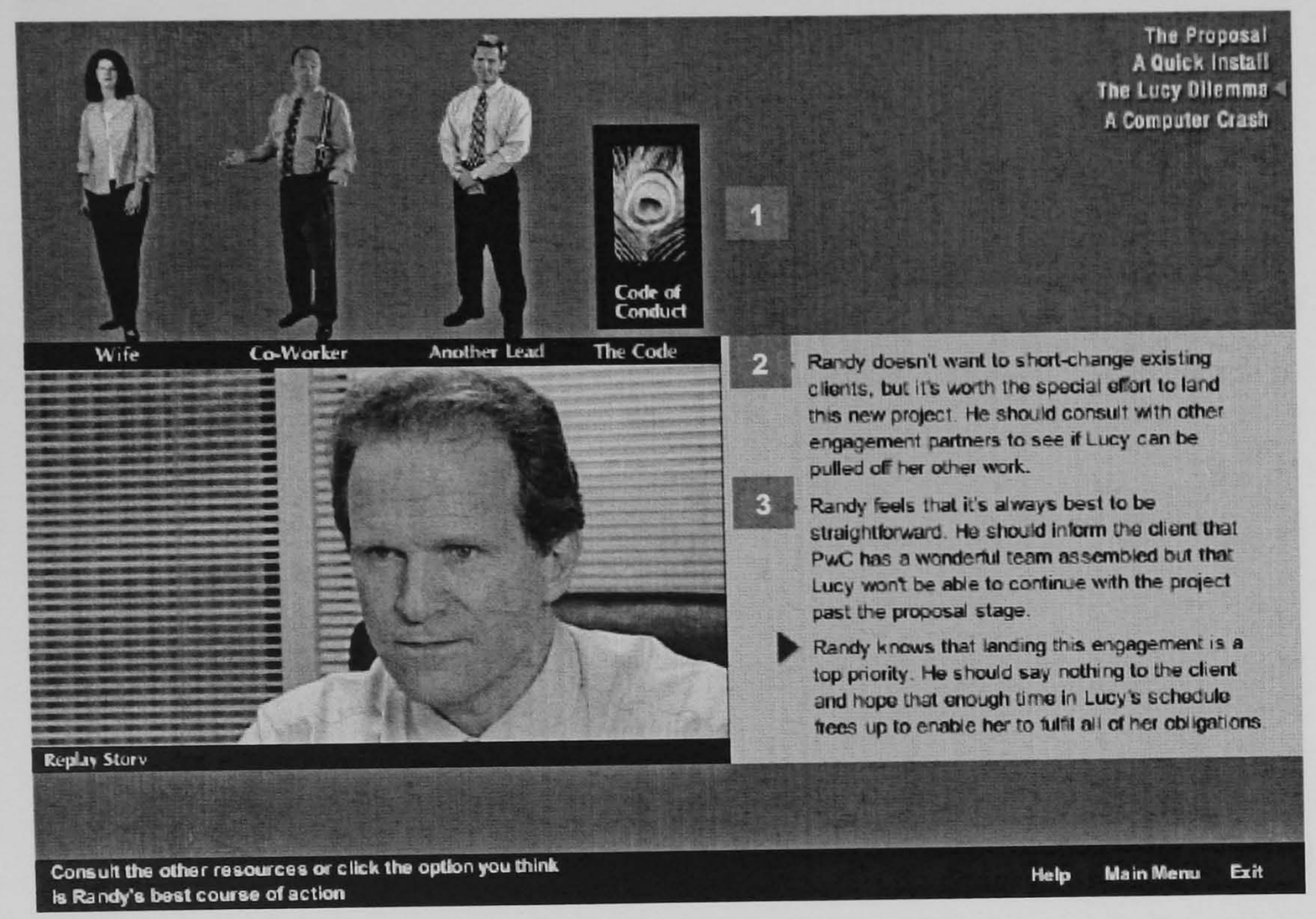


Feedback for NtG1 response (2)

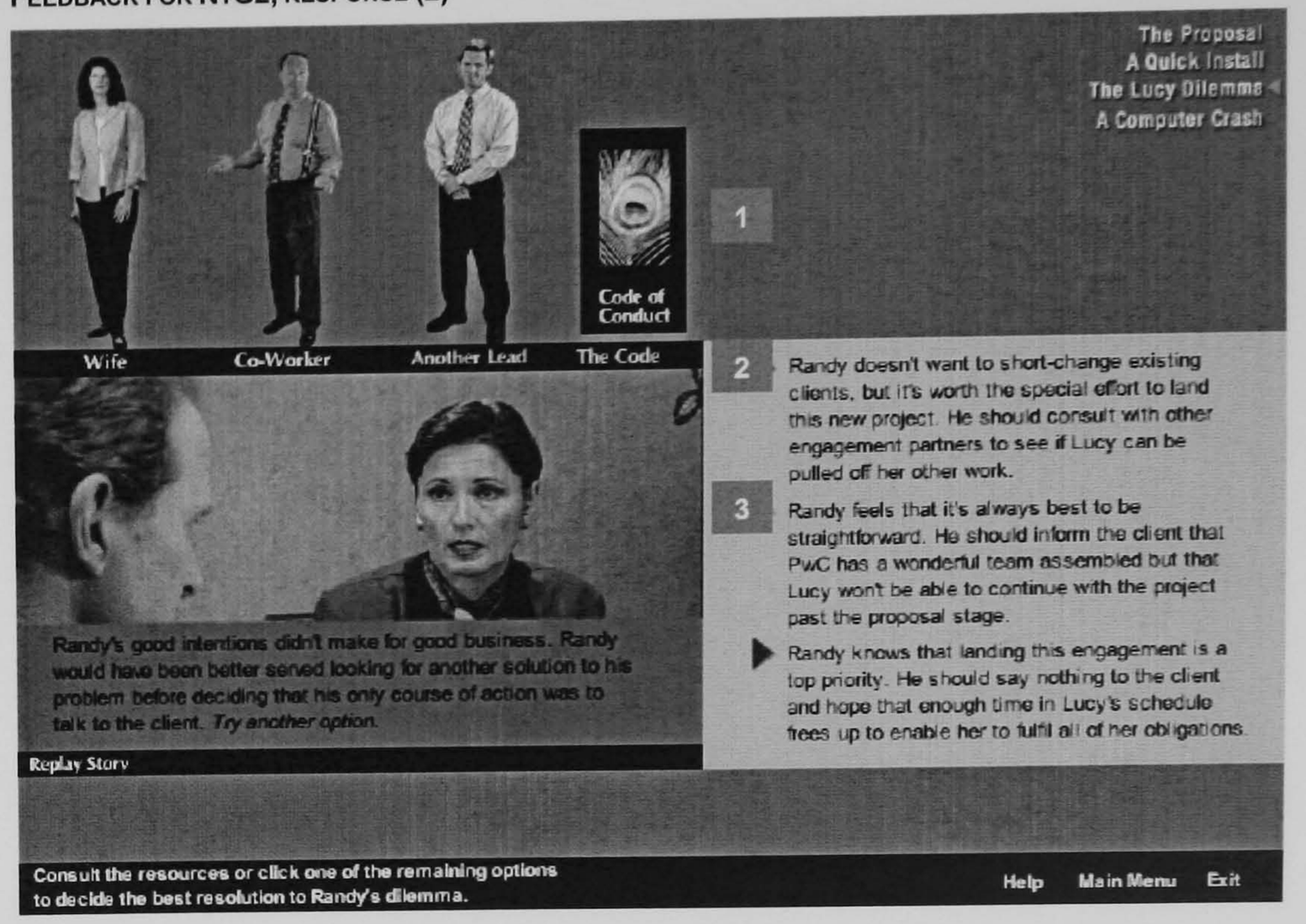


EXAMPLE NTG2 - THE LUCY DILEMMA

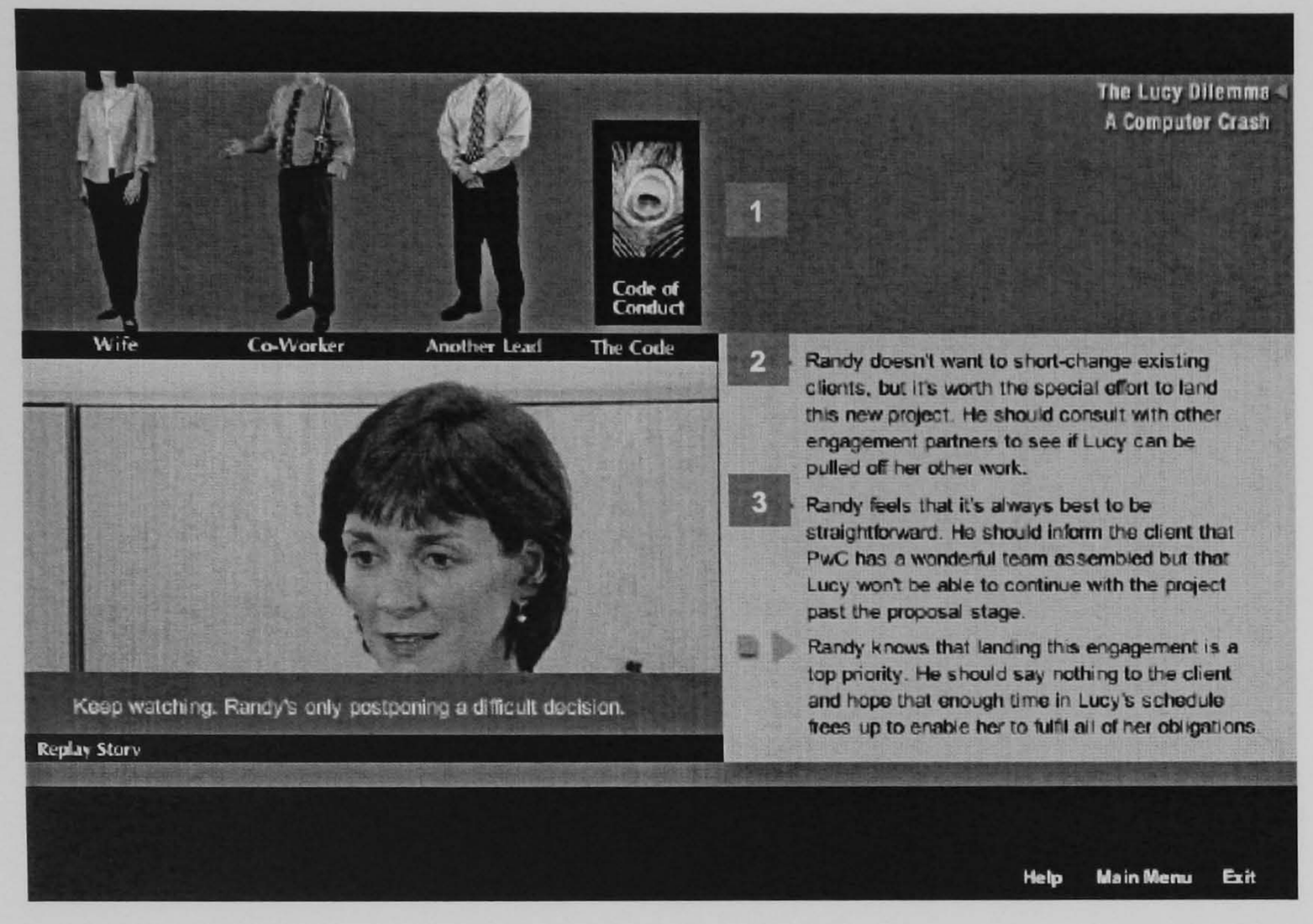
TASK



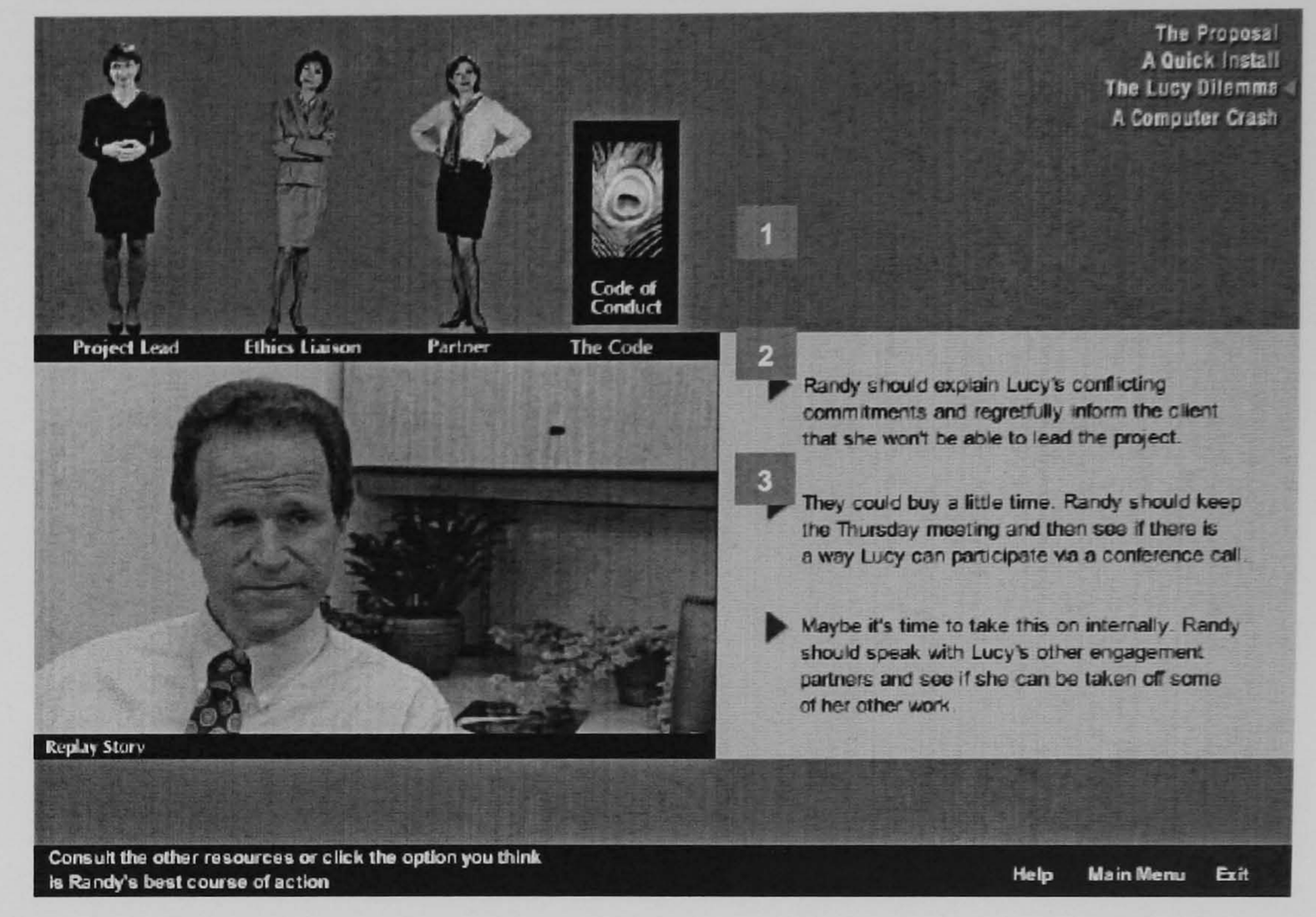
FEEDBACK FOR NTG2, RESPONSE (2)



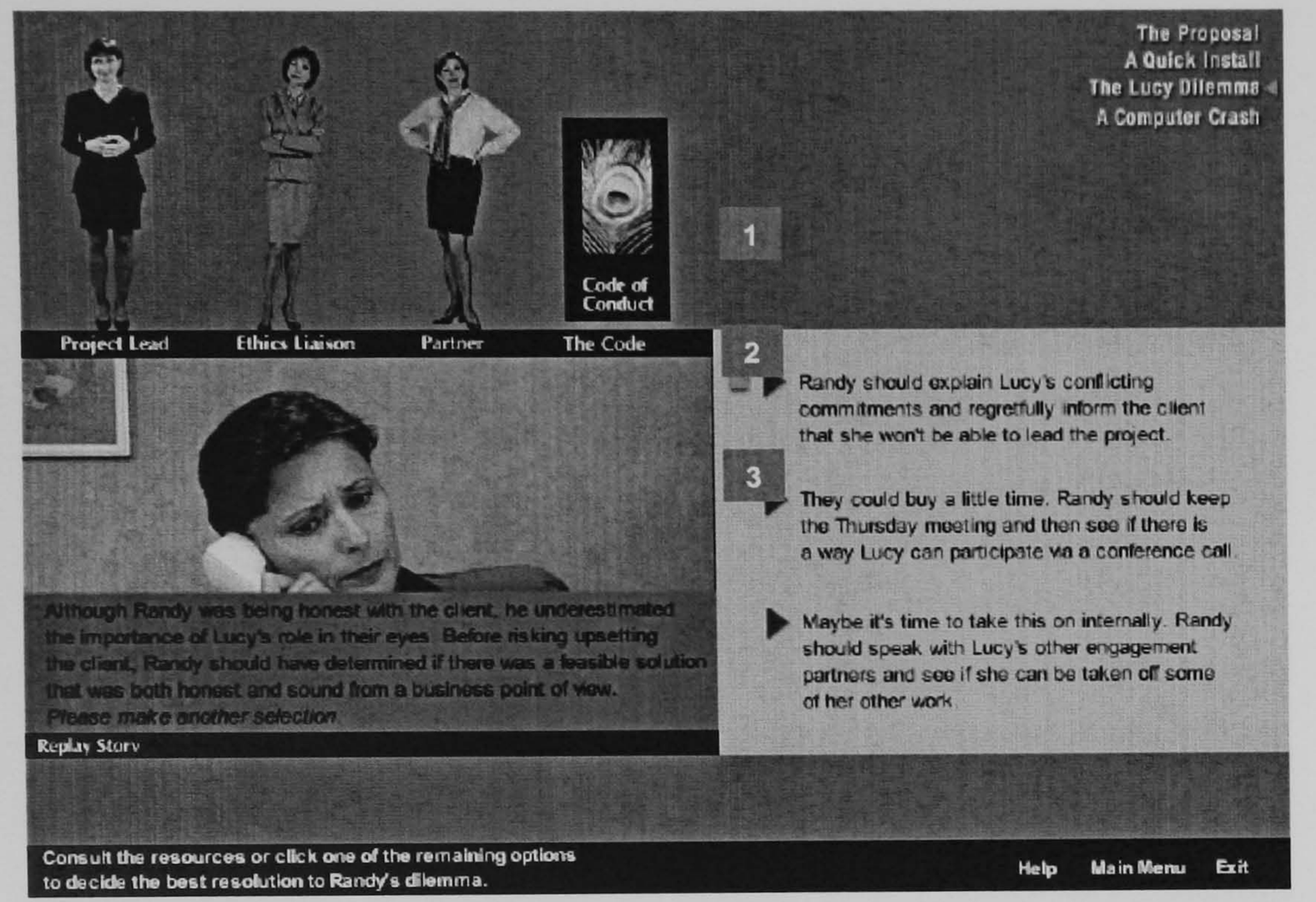
FEEDBACK FOR NTG2, RESPONSE (3)



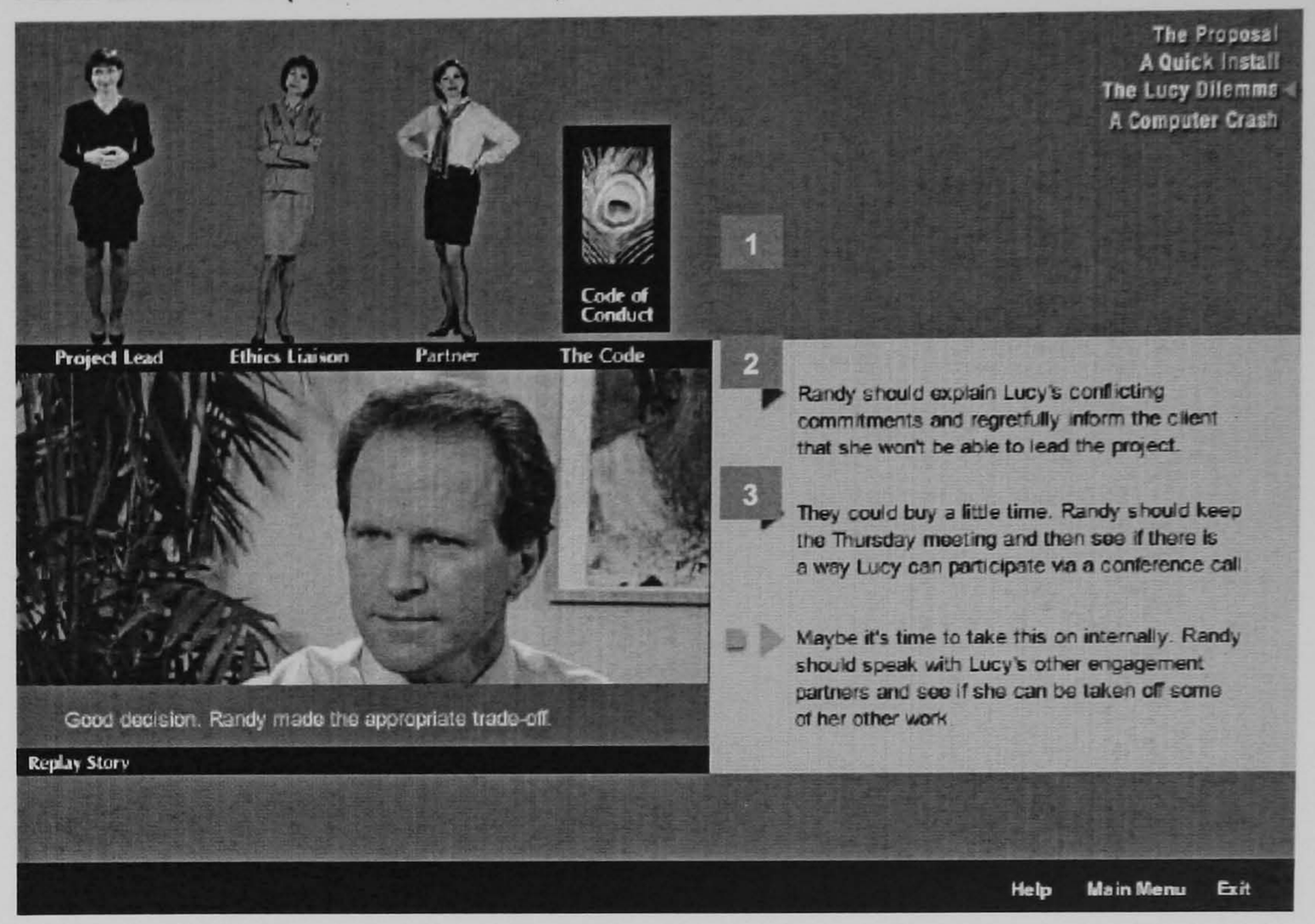
NTG2: FOLLOW-ON PROBLEM



FEEDBACK FOR NTG2 (FOLLOW-ON PROBLEM), RESPONSE (1)

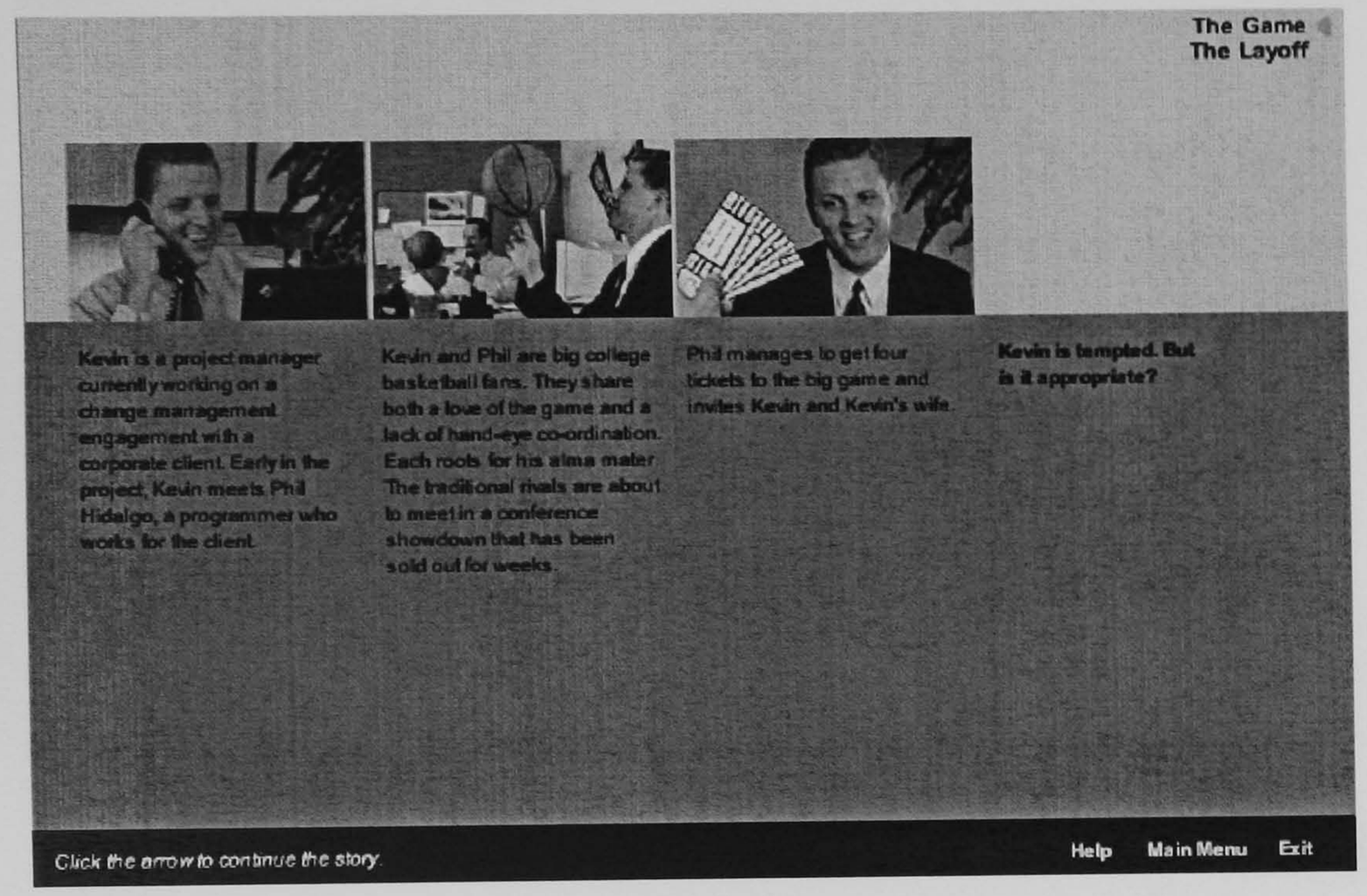


FEEDBACK FOR NTG2 (FOLLOW-ON PROBLEM), RESPONSE (3)

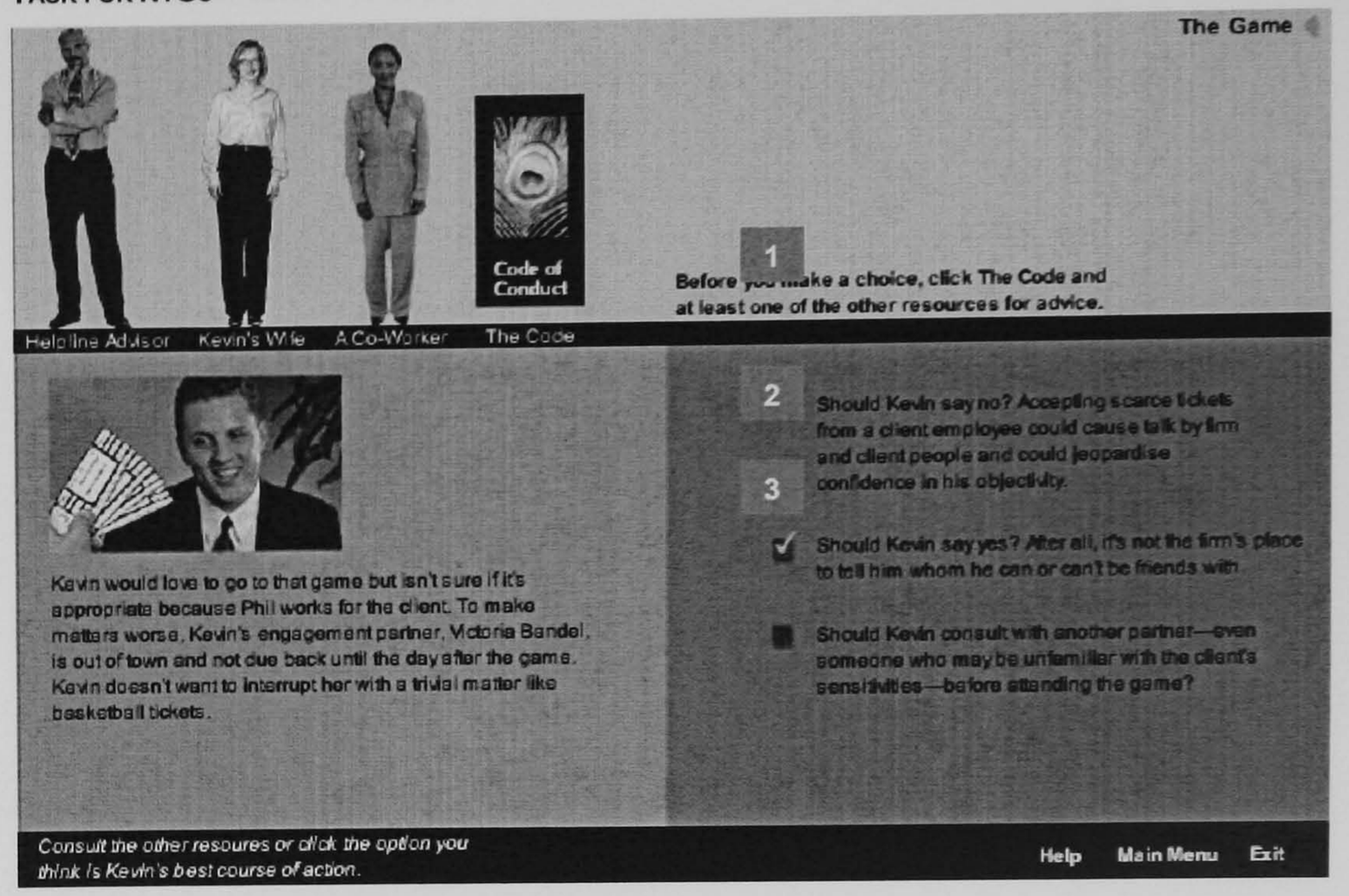


EXAMPLE NTG3 - THE GAME

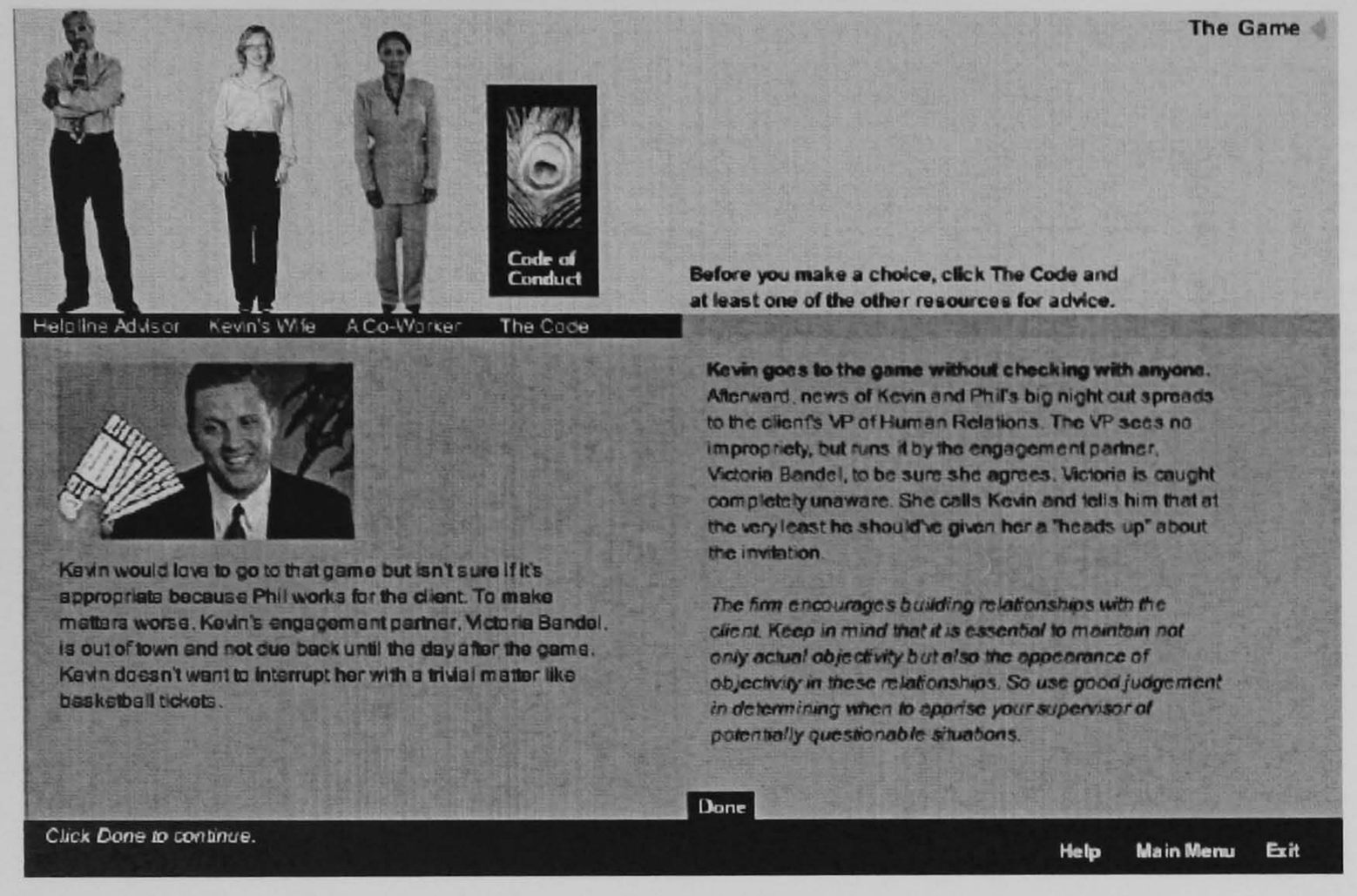
SCENARIO



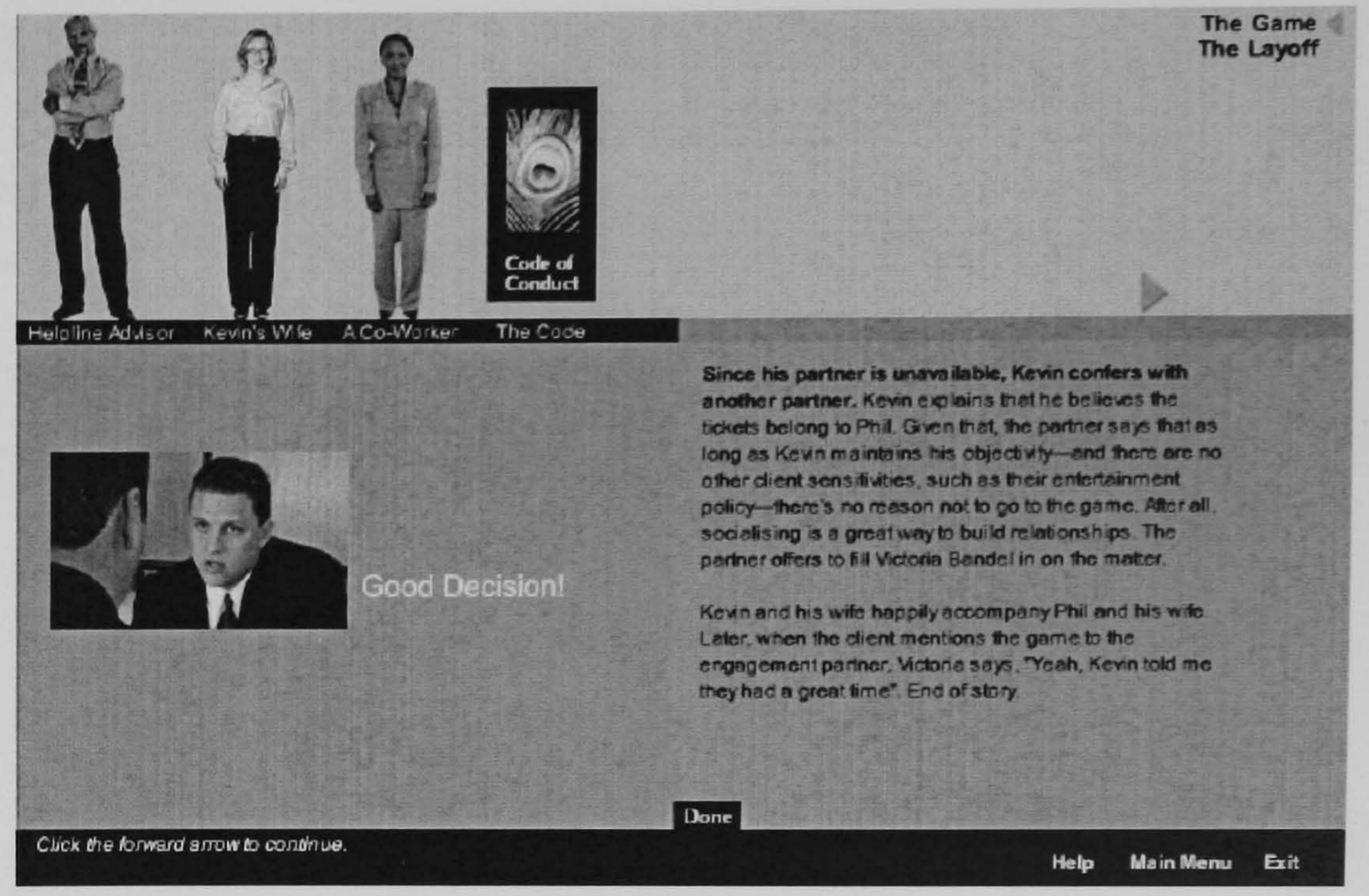
TASK FOR NTG3



FEEDBACK FOR NTG3 RESPONSE (2)



FEEDBACK FOR NTG3 RESPONSE (C)



Appendix H: Study 4 Storyboard

1: Project management - Scenario and task design #1

NARRATOR: "You've got mail from Karl Zingg, one of your team leaders, following his meeting with Sipho Nogata".

TO:	Project manager
FROM:	Karl Zingg
SUBJECT	Scope review?

My team had an interesting meeting with Sipho Nogata last week. We reviewed the client requirements for the 'parts' order-routing software, and drew up a shortlist of vendors.

Our meeting brought out some new ideas about re-engineering the sales-to-production process. We talked of a scenario where sales orders feed directly into a parts-order-routing process, which will promote Just In Time production. Sipho asked us to look for fully integrated sales-to-production software.

As a result, one of my team is re-looking at software vendors to see who can meet these additional requirements

NARRATOR : "How will you respond to this email? It looks like Karl might fall into the trap of *scope-creep*. What advice would you give him?

Use the Scratchpad on the computer screen to type in your notes, and press 'Save' when you want to see the model-answer feedback".



1

1: Project management - Task design #2

NARRATOR : "How will you respond to this email? It looks like Karl might fall into the trap of *scope-creep*. What advice would you give him? Select the advice you would give him"

RESPONSE OPTIONS

1. Repeat the message to Karl that objectives are clearly defined in the project contract (i.e. selection of order routing software), and that integration with sales orders and the add-on of SWIFT payment processing are out-of-scope.

Tell Karl to arrange another meeting with Sipho Nogata, and to politely explain that the SWIFT and software integration are out-of-scope.

2. Congratulate Karl on spotting this opportunity to meet additional client needs. Contact Sipho Nogata, and tell him that since some staff are under-used at the moment, you will use them to complete the additional work he has requested.

3. Congratulate Karl on spotting this opportunity to meet additional client needs, but add that any revision of scope should be formally agreed with the client. Arrange a meeting with Sipho Nogata to clarify the client's understanding of the original project scope, and to investigate whether scope should be formally extended in the light of Sipho's comments.

2

1: Project management - Feedback for design #1

FEEDBACK

Repeat the message to Karl that objectives are clearly defined in the project contract (i.e. selection of order routing software), and that integration with sales orders and the add-on of SWIFT payment processing are out-of-scope).

Meet Sipho Nogata and explain that SWIFT and software integration are currently out-of-scope. Discuss whether new resources should be brought in to complete the additional work as part of a formally agreed revision of scope, which would be formally documented as a contractual change. Ask Sipho whether he would like a systems integration expert to talk to him about his ideas, and prepare a scoping proposal.

3

1: Project management - Feedback for design #2

FEEDBACK for OPTION 1

The danger of scope creep is serious enough for you - as project manager - to become involved. If you delegate this task to your junior team member, your own status as project manager may be eroded; you may appear to be avoiding this difficult issue.

You should meet Sipho Nogata and explain that SWIFT and software integration are currently out-of-scope. You should also and discuss whether new resources should be brought in to complete the additional work as part of a formally agreed revision of scope, which would be formally documented as a contractual change. Ask Sipho whether he would like a systems integration expert to talk to him about his ideas, and prepare a scoping proposal.

4

1: Project management - Feedback for design #2

FEEDBACK for OPTION 2

You are putting the client's needs first, but potentially at the expense of the interests of the firm. Unless the extension to scope is formally agreed, and all cost implications discussed with the client, the firm may end up with a financial loss on this project.

You should meet Sipho Nogata and explain that SWIFT and software integration are currently out-of-scope. You should also and discuss whether new resources should be brought in to complete the additional work as part of a formally agreed revision of scope, which would be formally documented as a contractual change. Ask Sipho whether he would like a systems integration expert to talk to him about his ideas, and prepare a scoping proposal.

5

1: Project management - Feedback for design #2

FEEDBACK for OPTION 3

This approach provides the correct balance between respect for the client's needs, and concern for the financial implications to [the firm] of scope-creep.

You should meet Sipho Nogata and explain that SWIFT and software integration are currently out-of-scope. You should also and discuss whether new resources should be brought in to complete the additional work as part of a formally agreed revision of scope, which would be formally documented as a contractual change. Ask Sipho whether he would like a systems integration expert to talk to him about his ideas, and prepare a scoping proposal.

6

2: Business ethics - Scenario



Kevin is a project manager currently working on a change management engagement with a corporate client. Early in the project, Kevin meets Phil Nicolao, a programmer who works for the client.

7

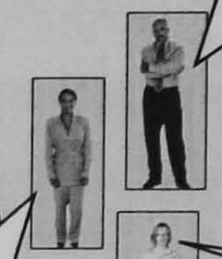
2: Business ethics - Task

NARRATOR : Kevin would love to go to that game but isn't sure if it's appropriate because Phil works for the client. To make matter's worse, Kevin's engagement partner, Victoria Bandel, is out-of-town and not due back until a few days after the game. Kevin doesn't want to interrupt her with a trivial matter like basketball tickets.

RESPONSE OPTIONS
1. Should Kevin say no?
2. Should Kevin say yes?
3. Should Kevin consult with another partner?

8

2: Business ethics - Feedback design #1



ETHICS HELPLINE ADVISOR - Ed Dallas

When Kevin calls the Helpline, the advisor asks a series of questions:

* Have you accepted any other gifts from Phil or the company?

* How much are the tickets worth?

* Are they Phil's personal tickets or from his company?

Kevin assumes these are Phil's personal tickets. The advisor says that even though Kevin wouldn't be breaking any rules, he wonders if Kevin's objectivity might be compromised by accepting the tickets - or just as important, his *appearance* of objectivity. He suggests that Kevin speak to his engagement partner.

CO-WORKER - Sheila Washington

Kevin mentions the situation to a co-worker. He explains that his engagement partner is out of town, and not back till 2 days after the game. Sheila says that under the circumstances, she doesn't think the situation merits tracking down his engagement partner. Kevin should just run it by another partner.

Sheila says, "Even though another partner may not know this client, most partners have dealt with similar questions at some point".

KEVIN'S WIFE - Barbara McNamara

Kevin's wife is very excited about Phil's invitation. She's as big a basketball fan as her husband! But Kevin tells her that firm policy says something about not accepting gifts that aren't available to the client's other vendors or suppliers. Kevin's wife replies that they don't even know if they *are* client tickets.

In any case, doesn't the firm encourage socialising with the client? Phil might not be so friendly if Kevin declines the tickets. Besides, tickets to a ball game aren't anything to worry about. "It's not like the guy's offering you a new car".

9

2: Business ethics - Feedback design #2

FEEDBACK for OPTION 1
Kevin declines the tickets. Kevin thanks Phil for the offer but explains that he doesn't want to raise any eyebrows on either side of the engagement. Phil shrugs and says "OK, but it's going to be a great game". Phil easily finds other guests to accompany him. And it IS a great game. After the event, Kevin and Phil continue to talk basketball, but Phil doesn't seem quite as friendly. *Kevin made a defensible choice, but an opportunity for fun and relationship-building was lost. People meet and friendships develop outside the office. That's fine. As long as steps are taken to maintain objectivity, it's good for business to be on genuinely friendly terms with the client. Kevin should have called his engagement partner to talk about the invitation to the game.*

10

2: Business ethics - Feedback design #2

FEEDBACK for OPTION 2
Kevin goes to the game without checking with anyone. Afterwards, news of the Kevin and Phil's big night out spreads to the client's vice-president of Human Relations. The VP sees no impropriety, but runs it by the firm's engagement partner, Victoria Bandel, to be sure that she agrees. Victoria is caught completely unaware. She calls Kevin and tells him that at the the very least he should have given her a 'heads up' about the invitation. *The firm encourages staff to build relationships with clients. Keep in mind that it is essential to maintain not only actual objectivity, but also the appearance of objectivity in these relationships. So use good judgement in determining when to apprise your supervisor or partner of potentially questionable situations.*

11

2: Business ethics - Feedback design #2

FEEDBACK for OPTION 3
Since his partner is unavailable, Kevin confers with another partner. Kevin explains that he believes the tickets belong to Phil. Given that, the partner says that as long as Kevin maintains his objectivity - and there are no other client sensitivities such as their entertainment policy - there is not reason not to go to the game. After all, socialising is a great way to build relationships. The partner offers to fill Victoria Bandel in on the matter. *Kevin and his wife happily accompany Phil and his wife. Later, when the client mentions the game to the engagement partner, Victoria says "Yes, Kevin told me they had a great time". End of story.*

12

3: Project management - Scenario and task

NARRATOR: "The project kick-off meeting is about to start. This is your chance to orientate the team with background information, and introduce a spirit of positive team-working. They'll be full of questions, I'm sure, so it's best to be prepared.

"In your role as project manager, what five key points do you want to raise to your staff? Jot them down in the Scratchpad".



13

3: Project management - Feedback #1

CHECKLIST for kick-off meeting

The project

- ☐ Distribute project plan
- ☐ Give background information on client
- ☐ Discuss project goals, objectives, deliverables and deadlines
- ☐ Discuss procedures for changes in scope

Team

- ☐ Explain team roles
- ☐ Give out profile of each specialist advisor
- ☐ Use flowchart to go through quality control procedures
- ☐ Explain reporting lines and hand out project organisation chart
- ☐ Discuss procedures for resolving difficulties during project engagement

Client

- ☐ Hand out client organisation chart
- ☐ Explain client sensitivities
- ☐ Give summary of previous project work and relationships with client
- ☐ Agree dates for each team member to be introduced to client

Housekeeping

- ☐ Give out client account code, and distribute sample time and expense sheets
- ☐ Discuss working hours
- ☐ Agree procedures for allocating holiday time
- ☐ Confirm start dates individually with each team member
- ☐ Distribute hotel address

14

3: Project management - Feedback #2

AIDE-MEMOIRE for kick-off meeting

The project

Project plan and client

Overview of project goals and objectives

Deliverables and client deadlines

Team

Team members and roles

Specialist advisors

Quality control procedures

Reporting lines

Client

Key client contacts and their roles

Client sensitivities

The firm's past experiences with client

Housekeeping

Expenses

Timesheets (including policy on billable time)

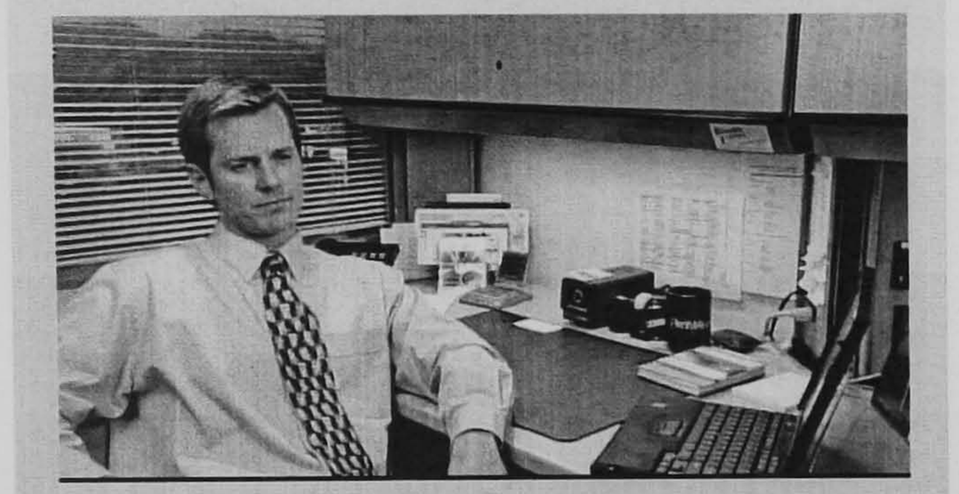
Holidays

Start dates

Accommodation

15

4: Business ethics - Scenario (1/2)



16

4: Business ethics - Scenario (2/2)



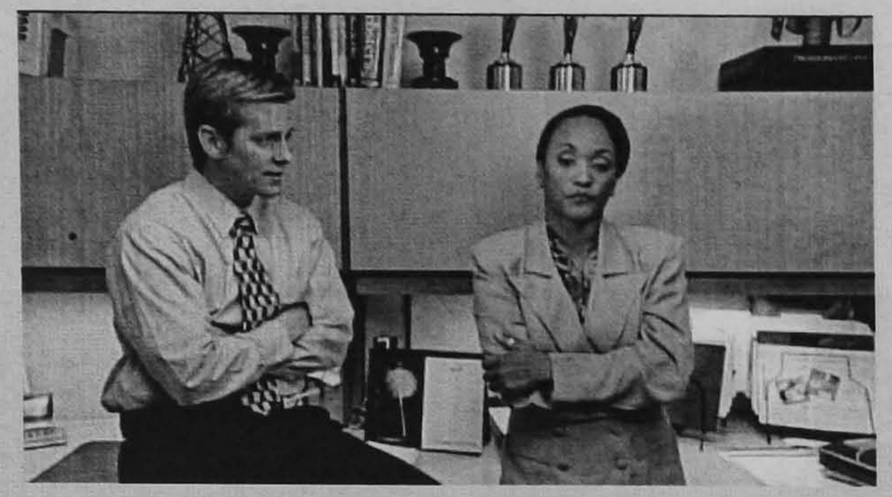
17

4: Business ethics - Task

RESPONSE OPTIONS	
1. There's not much to be gained from making a mountain out of a molehill. Since Sheila understands that Harry didn't mean offence, Steve should counsel her to let it go.	▷
2. If they meet face to face, Sheila and Harry can hopefully clear the air. Steve should encourage Sheila to talk to Harry.	▷
3. Since Sheila is upset, it would be good to let Harry know about the situation and see if he can make amends with her. Steve should pull Harry aside.	▷

18

4: Business ethics - Feedback for option 1



19

4: Business ethics - Additional text feedback for option 1

ADDITIONAL TEXT FEEDBACK

It may seem obvious that Harry shouldn't use what some might see as racially-charged examples. But if it were obvious to Harry, he wouldn't have used them in the first place, let alone in this second instance. The real question is whether a reasonable person could be offended by the email, not just whether Sheila is offended. When Sheila talked to Steve, management was officially put on notice that the email might be considered offensive. If the situation blows out of control and management is seen to have done nothing, this sets a very poor example, and could have serious repercussions.

20

4: Business ethics - Feedback for option 1 (1/2)



21

4: Business ethics - Feedback for option 2 (2/2)



22

4: Business ethics - Additional text feedback for option 2

ADDITIONAL TEXT FEEDBACK

In this scenario it is best to be direct so that Sheila can explain her personal concerns. She can point out that others may also have been offended. The real question is whether a reasonable person could be offended by the email, not just whether Sheila is offended. When Sheila talked to Steve, management was officially put on notice that the email might be considered offensive. If the situation blows out of control and management is seen to have done nothing, this sets a very poor example, and could have serious repercussions.

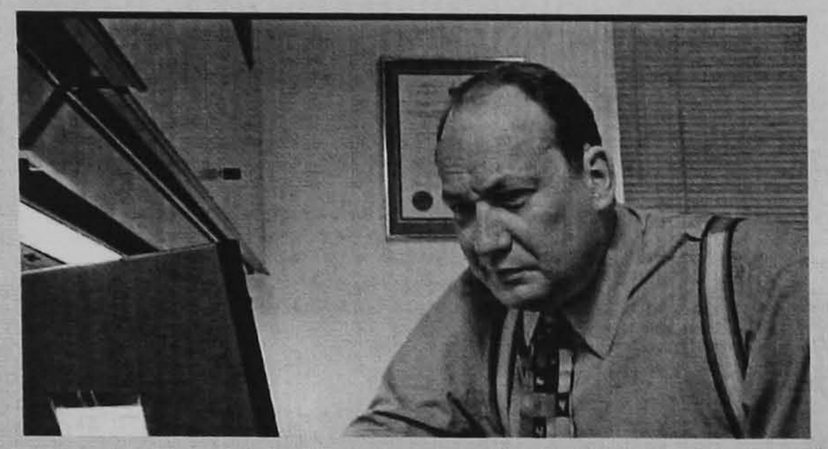
23

4: Business ethics - Feedback for option 3 (1/2)



24

4: Business ethics - Feedback for option 3 (2/2)



25

4: Business ethics - Additional text feedback for option 3

ADDITIONAL TEXT FEEDBACK

A 'heads-up' may not be enough. Steve has not communicated Sheila's concerns strongly enough, and Harry believes that the only person who might be offended is Sheila. The real question is whether a reasonable person could be offended by the email, not just whether Sheila is offended. When Sheila talked to Steve, management was officially put on notice that the email might be considered offensive. If the situation blows out of control and management is seen to have done nothing, this sets a very poor example, and could have serious repercussions.

26

5: Coaching skills: Scenario and task

SCENARIO: You are coach and mentor to a protégé called Gerry.

Your protégé has completed a self-assessment profile, prior to his annual assessment-of-work. As coach, you're not directly involved in his annual assessment, but he has shown you his profile. You (privately) disagree with it; it is higher than you feel he can demonstrate. He seems somewhat defensive, and you think he might be resistant to an alternative point of view. What do you do?

RESPONSE OPTIONS

1. Try to understand the protégé's perspective before doing anything else.
2. Don't say anything. Discuss the matter with the protégé after he gets his assessment results because he will then be more open.
3. Insist that the protégé change his performance assessment.
4. Educate him about the assessment process and about what is really required.

27

5: Coaching skills: Feedback for option 1

FEEDBACK

Correct. Bracketing your disagreement first will allow you to inquire further.

28

5: Coaching skills: Feedback for option 2

FEEDBACK

Incorrect. Although *not* stating your disagreement initially is a good strategy based on your perception of his mood, if you withhold your opinion until the results phase, this might negatively impact his result and his trust in you.

29

5: Coaching skills: Feedback for option 3

FEEDBACK

Incorrect. Some revision of the assessment might be useful, but the first step is to inquire, especially if the protégé seems defensive.

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5: Coaching skills: Feedback for option 4

FEEDBACK
Incorrect. This information might help the protégé, but only if he needs the information. You won't know the protégé's needs or issues unless you inquire further.

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APPENDIX I: OUTCOME TABLE

Example outcome table from study 4, showing summaries of interviewees' responses to feedback, and relationships between interviewees' outcomes and the attributes of feedback

	Interviewees' ratings, outcomes and comments for each activity example				
I/vee & grade	Ex 1: Project management (1) Model answer FB (2) Brief explanation + specification of correct response	Ex2: Business ethics (1) Multiple perspectives (2) Description of outcome + explanation	Ex 3: Project management (1) Checklist (detailed, action-oriented) (2) Planning aid (summary)	Ex 4: Business ethics (1) Video of likely outcome (2) Explanation	Ex 5: Coaching (1) Brief explanation (No second FB style)
SF1 Grade 6	(1) 3 OK	(1) 3 DISM FB: MPs *are* useful in principle, *but*: The MPs in the example were only opinions; they lacked supportive argument. Choice of MPs was unbalanced (more opinions from peers should have been presented, otherwise lacked credibility). The firm's view should be explicated given the legal implications of this problem.	(1) 3 SAT	(1) 2 DISM FB: Video did not explicate the issues (therefore incomplete); Would not personally have acted as shown on the video (therefore the outcome lacked credibility and was dismissed); The firm's view should be explicated given the legal implications of this problem.	(1) 1 DISM TASK: Lacked credibility by asking the wrong question, and by asking learner to select a single RO where several should have been carried out. FB: No retro-coverage; No processual-coverage of how to resolve the problem over the long term.
	(2) 1 INCOMPL FB: Lacked issues-coverage; no explanation of why alternatives were incorrect; just repeats the RO	(2) 1 INCOMPL Lacked retro-coverage	(2) 2 OK	(2) 2 INCOMPL FB: No specification of correct behaviour	N/A
SF2 Grade 1	(1) 4 SAT TASK: Confused by open-question FB: Liked specification of the correct response	(1) 1 DISM TASK: Dismissed because cultural differences reduced transferability of KLPs FB: Dismissed because the MPs were "just opinions", and there was no rule to say [her] opinion was not acceptable.	(1) 4 SAT FB: Whole sentences and verbs brought the activity to life; they made more sense.	(1) 1 CONF TASK: Video was more attractive than text, but didn't add much information. FB: What was the KLP? Video-outcome FB was "not teaching anything".	(1) 4 SAT FB: Satisfied, but unsure why the others were wrong. Retro-coverage would improve the feedback.

	Interviewees' ratings, outcomes and comments for each activity example				
I/vee & grade	Ex 1: Project management (1) Model answer FB (2) Brief explanation + specification of correct response	Ex2: Business ethics (1) Multiple perspectives (2) Description of outcome + explanation	Ex 3: Project management (1) Checklist (detailed, action-oriented) (2) Planning aid (summary)	Ex 4: Business ethics (1) Video of likely outcome (2) Explanation	Ex 5: Coaching (1) Brief explanation (No second FB style)
	(2) 4 INCOMPL FB: Liked specification of the correct response, but also wanted to be told the general guiding principle	(2) 4 SAT FB: Liked having video-outcome backed by statement of general principle. Without the principle, the video-outcome would not be useful.	(2) 3 OK	(2) 3 INCOMPL FB: KLP was not clear enough.	N/A
SF3 Grade 1	(1) 4 SAT FB: Felt that the first part explained why the other ROs were incorrect. Appreciated the limitations of e-learning, in that in reality there isn't a SCA. "That's the way these systems have to work". Could be improved by having more discussion; more pros and cons.	(1) 3 SAT but INCOMPL FB: Liked having MPs because it "helps you to think around the situation", but wanted the know the CR	(1) 5 SAT FB: Liked having the detail	(1) 3 INCOMPL FB: No retro-coverage, therefore left unsure of the KLPs. Felt that as the situation might have unfolded quite differently, it was especially important to explain the KLPs	(1) 2.5 FRUST FB: Felt that her selection would be appropriate in the circumstances she had in mind. The FB had not convinced her otherwise. No retro-coverage.
	(2) 3 CONF FB: Liked having specification of the CR, but was confused by lack of retro-coverage because the FB doesn't imply that the others were any less appropriate.	(2) 4 SAT FB: Liked knowing the CR. "It may be because I've only just started in the company, and I haven't had time to work out 'firm' policy ... I'd like to see the sorts of things that would be more appropriate... it'd make me feel more secure"	(2) 4 SAT	(2) 4 SAT	N/A

Appendix J
Transformations of qualitative data

Screenprints from Excel showing numerical equivalents for style-of-engagement and outcomes for each interviewee in studies 2 and 3.

		STYLES-OF-ENGAGEMENT & WEIGHTING								OUTCOMES & WEIGHTING							
I/vee	Grade	Mindful	L4TAs	Explor'g	W TV	PtG	GTI	GTTM	Weighted mindfulness	N/C	OK	Sat	Incom	Conf	Frustr	Dism	Weighted outcome
Weighting		4	3	2	1	0	0	0		0	1	2	-1	-2	-1	-1	
C1	6	0.75					0.25		3.00					1		2	-4
C2	4				0.25		0.75		0.25	1	1	1					3
C3	3	0.25						0.75	1.00			1		1		1	-1
C4	3		0.33		0.33			0.33	1.33		1	1		1			1
C5	5	0.75		0.25					3.50	1		2					4
C6	5	0.50	0.50						3.50		1					2	-1
C7	5	1.00							4.00		1	1	1				2
C8	7	0.75					0.25		3.00	1		1				1	1
C9	4	0.33			0.33	0.33			1.67			2		1			2
C10	5	0.75					0.25		3.00			1			1	1	0
C11	5	0.50	0.50						3.50				1	1		1	-4
C12	3		0.50			0.50			1.50			1		1		1	-1
C13	4	0.75	0.25						3.75			1		1	1		-1
C14	4	0.50						0.50	2.00			3					6
C15	3		0.25					0.75	0.75	1		2					4
C16	5							1.00	0.00		1	1				1	2
C17	4				0.25	0.50		0.25	0.25		1	1				1	2
C18	4		0.50	0.50					2.50			1				2	0

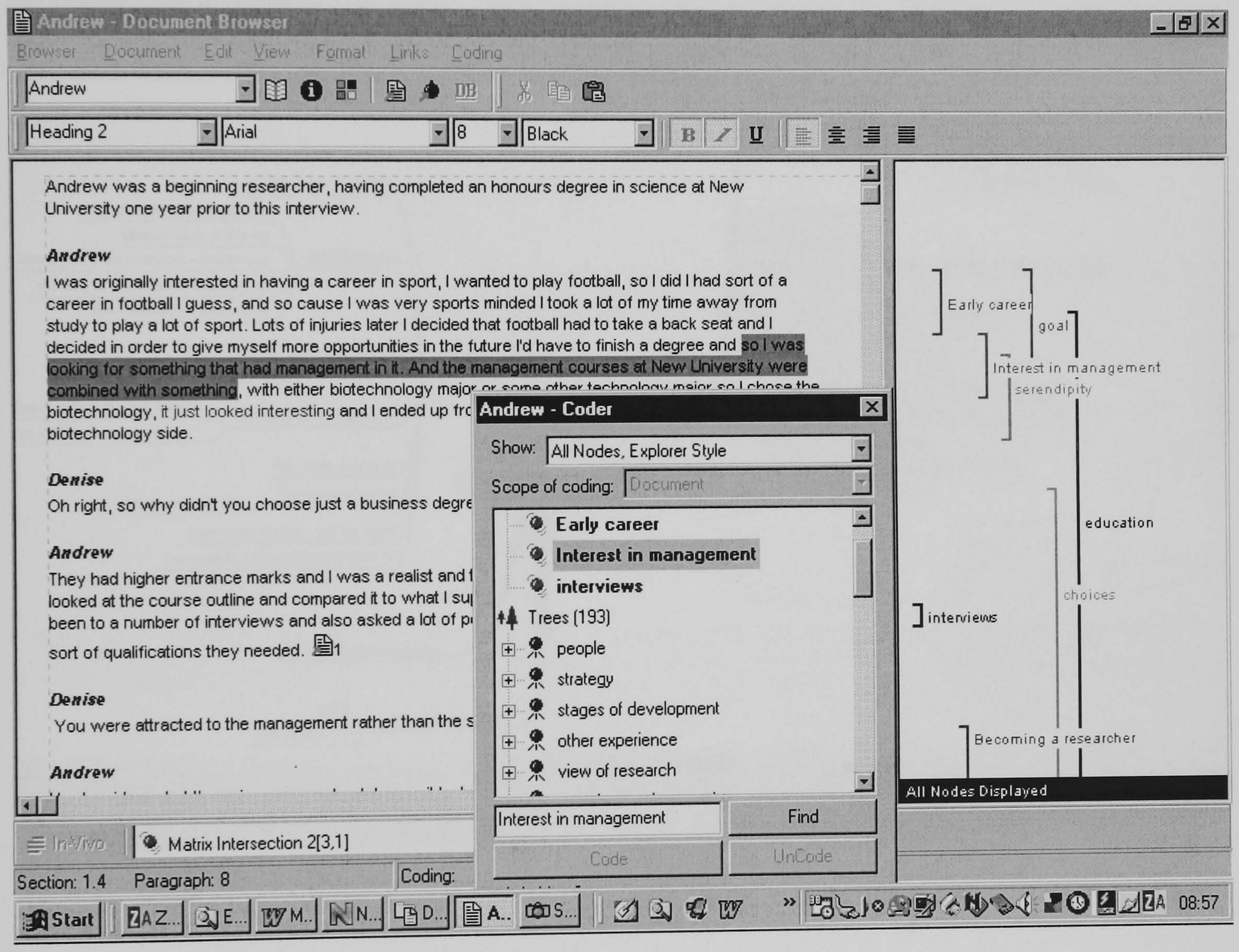
Study 2 (*Coaching Advantage*)

			STYLES-OF-ENGAGMENT & WEIGHTINGS								OUTCOMES & WEIGHTINGS							
I/V	Grd	Unit	Mindful	L4TAs	Explor'g	W TV	PtG	GTI	GTTM	Weighted mindfulness	N/C	OK	Sat	Incom	Conf	Frustr	Dism	Weighted outcome
Weighting			4	3	2	1	0	0	0		0	1	2	-1	-2	-1	-1	
N1	2	A	0.75					0.25		3.00			2	1				3
N2	1	A			0.33	0.33		0.33		1.00	1		1	1				1
N3	1	M	0.75					0.25		3.00			1	1		1		0
N4	2	O		0.13		0.75		0.13		1.13			2	1				3
N5	2	O		0.75		0.25				2.50			1	2				0
N6	5	M	1.00							4.00				3				-3
N7	3	M	0.25	0.75						3.25				1	1.5		0.5	-5
N8	1	A		0.25		0.25			0.50	1.00	1		1	1				1
N9	1	A	0.50					0.50		2.00			1	1			1	0
N10	2	O					0.50	0.50		0.00	1		1		1			0
N11	4	M		0.25		0.75				1.50	1			1		1		-2
N12	3	O				0.50			0.50	0.50			2	1				3
N13	4	A	0.50				0.50			2.00	1		1				1	1

Study 3 (*Navigating the Grey*)

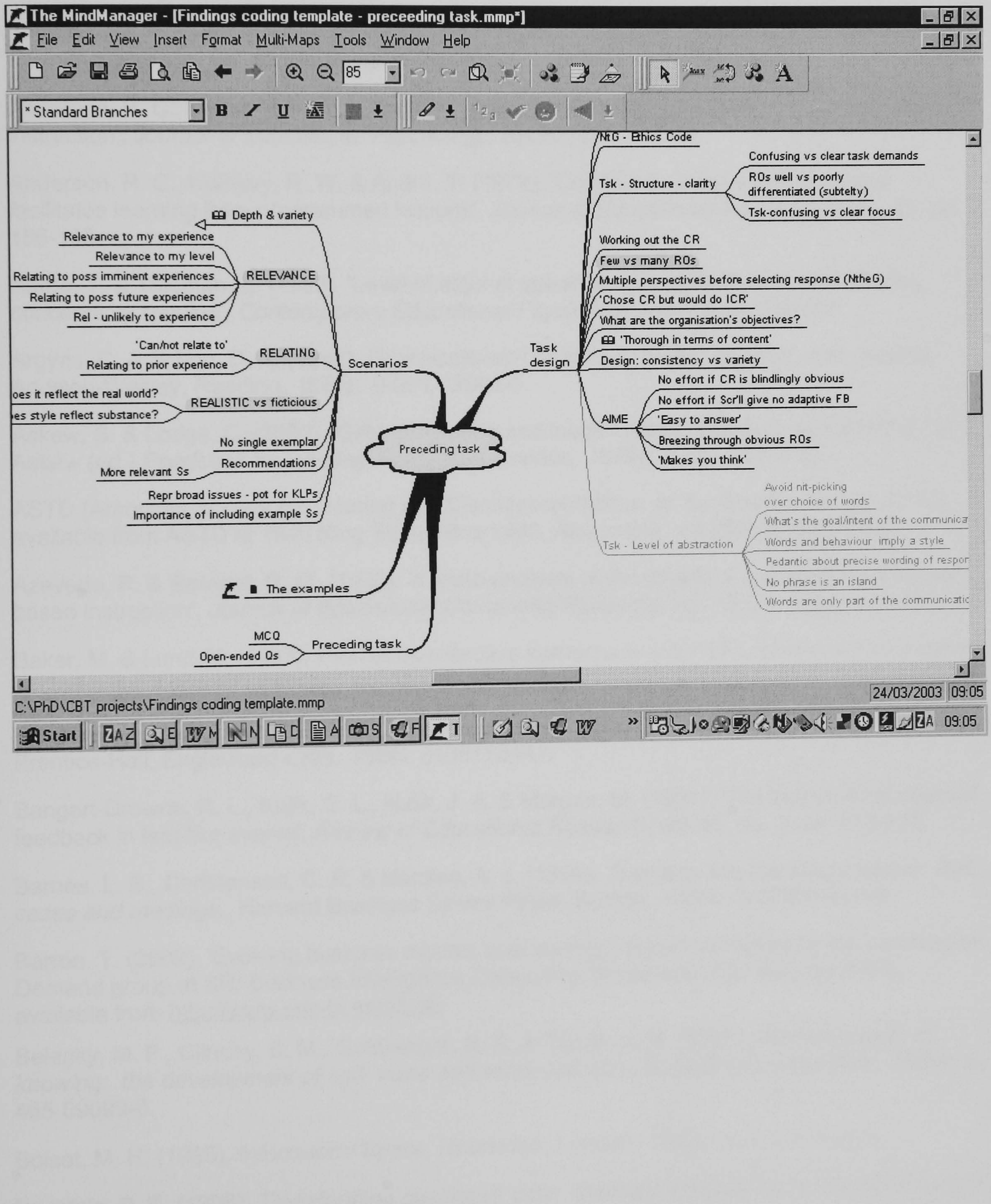
Appendix K
Example screenprint from NUD*IST NVivo application

The following screenprint presents the browse window showing a transcript from one of NVivo's tutorials. Also shown is the coder dialog box which provides one of several means to code transcripts, as well as the coding stripes indicating text already coded.



Appendix L
Example Screenprint from MindManager Application

The following screenprint shows one of the many preliminary conceptual maps used during analysis.



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