Continuing Professional Development in Medical Radiation Science: Journey towards reflective practice in cyberspace

This thesis is presented in total fulfilment of the requirements for the award of the Degree of Doctor of Philosophy

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To my mother, for her love and support

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System of reference for direct quotations

Quotes from CPD Survey are referenced as follows:

Radiography: 171	Refers to MRS practitioner number 171 (radiography)
RT: 232	Refers to MRS practitioner number 232 (radiation therapy)
Management: 27	Refers to MRS practitioner number 27 (management)
US: 282	Refers to MRS practitioner number 262 (sonography)
NM: 190	Refers to MRS practitioner number 190 (nuclear medicine),
Academic: 5	Refers to MRS academic staff number 5

Quotes from interview with Heads of Clinical Department (HODs) are referenced as follows:

HOD2	Refers to quote from interview with HOD number 2

Quotes from 1st pilot and 2nd pilot online module are referenced as follows:

Participants of online module	Denoted by the letter P
1st pilot online module	Abbreviated as '1st pilot'
eg. P11: 1st pilot	Refers to Participant 11 of 1st pilot online module
Fac2	Refers to Facilitator number 2

Quotes from Module C are referenced as follows:

Students of Module C	Denoted by the letter C
eg. Module C: S3	Refers to Student 3 of Module C
eg. Module C: the researcher	Refers to the researcher participating in Module C

Abbreviations

CPD	Continuing Professional Development
EBP	Evidence based practice
HODs	Heads of Clinical (Medical Radiation Science) Departments
HOD	Head of Clinical (Medical Radiation Science Department
MRS	Medical Radiation Science

Abstract

The study aimed to investigate how continuing professional development (CPD) activities, through the development of a CPD educational framework, can assist Medical Radiation Science (MRS) practitioners to engage in reflective practice while entrenched in a protocol driven workplace culture.

The study, with action research as the chosen methodology, and used both quantitative and qualitative methodology, was divided into two phases. The first phase of data collection aimed to inform the researcher of the needs of the MRS profession. The second phase of the study involved the design and development of an educational framework for CPD, based on current theories of learning and teaching using the framework and data collected from the first phase of the study, an online module was developed. The objectives of the module were to increase participants' knowledge in breast planning in radiation therapy by assisting participants to engage in reflective practice. The cyclical process of action research was used to pilot the module twice with two groups of volunteer radiation therapists.

The online module was evaluated using Kirkpatrick's four level evaluation model (Kirkpatrick, 1998; Guskey, 2000). Based on Boud et al.'s reflection model (1985), all participants showed evidence of action, affective and perspective outcomes. They also demonstrated successful development of lifelong learning attributes, were empowered and their learning had a positive impact in their workplace. They began to assume a more proactive role and increased clinical responsibilities, engaging colleagues in collaborative reflections and adopting evidence-based approaches in advancing workplace practices.

The study shows that it is possible to assist MRS practitioners to engage in reflective practice within a CPD educational framework online. The study also shows the importance of reflective practice, lifelong learning and transformative learning in CPD. Reflective practice liberates and empowers participants, lifelong learning equips them to continue learning and transformative learning facilitates perspective transformation. Thus, an effective educational framework is one that adopts a holistic approach towards CPD, by incorporating reflective practice, lifelong learning and transformative learning. The educational framework adopted in the present study may be extrapolated to CPD programs in other MRS disciplines and other healthcare professions.

Chapter 1

Introduction

1.1 The beginning of the journey
1.2 Overview of chapter
1.3 Background and rationale
1.3.1 Changes in healthcare system: impact on Medical Radiation Science
1.3.2 Definition of continuing professional development
1.4 Aims of study
1.5 Research questions
1.6 Significance of study
1.7 Overview of thesis

1.1 The beginning of the journey

It is difficult to pinpoint the precise beginning of this journey. It started sometime during the researcher's Master study. One of the major findings that arose out of that study was Medical Radiation Science (MRS) practitioners' preoccupation with clinical competencies, almost to the exclusion of other important competencies, namely those "generic" attributes related to lifelong learning. (In the present study, the terms 'attributes' and 'competencies' are used interchangeably.) Such a preoccupation, if left unchecked, can impact upon MRS practitioners' ability to continue learning and therefore their ability to deliver quality healthcare (Sim, 2000).

In view of the importance of lifelong learning attributes and the corresponding impact any deficiencies in learning competencies will have on patient care, the researcher became intrigued with the question of how to design a meaningful learning experience that would assist practitioners to develop their learning. In addition, with the increasing importance of online learning in higher education, the researcher was dissatisfied with her lack of knowledge and expertise in online learning. As her experience was restricted to 'dumping' lecture notes on WebCT, she decided to take on the unknown world of online learning and combine it with her quest to design a continuing professional development (CPD) program that would bridge the seemingly separate worlds of clinical and lifelong learning competencies.

1.2 Overview of chapter

Chapter One begins by examining the background and rationale for the study. The impact of major healthcare changes on the MRS profession and CPD in MRS is considered next. The study is then placed in context and the research questions that the study aims to address are presented. The chapter concludes with the significance of the study and an overview of the thesis. For the purpose of the study, the MRS profession refers to both radiography and radiation therapy disciplines.

1.3 Background and rationale

1.3.1 Changes in healthcare system: impact on Medical Radiation Science

Healthcare systems worldwide are undergoing rapid and significant changes (Higgs & Bithell, 2001). These changes are due to rapid advancements in technology, increasing short 'shelf-life' of professional knowledge, advances in clinical practice, decreasing health resources, reorganisation of the healthcare workforce resulting in the creation of new roles, and increasing consumer expectations (Birkenholz, 1999; Castle, Adrian-Harris, Holloway, & Race, 1997; Davies & Nutley, 2000; Duyff, 1999; Henwood, 1999; Hotvedt & Scotti, 1996; Houle, 1980; Maslin-Prothero, 1997; Mott, 2000; Snaith, McGuinness, & Yunis, 2004a). For health professions to remain relevant, it is essential that practitioners be responsive to the rapidly changing healthcare system.

For the purpose of the present study, this section focuses on the impact of healthcare changes on the MRS professions in the United Kingdom, United States and Australia. Using the United Kingdom and the United States for comparison with Australia is appropriate since the MRS professional associations in both countries are prominent MRS bodies worldwide. The American Society of Radiologic Technologists in the United States, the world's largest MRS professional association representing 118,000 MRS practitioners, is one of the prominent members of MRS professional association worldwide (The American Society of Radiologic Technologists, 2005). In the United Kingdom, the Society of Radiographers is one of the oldest radiography organisations in the world and its policies and developments are closely watched by the MRS professions worldwide (Australian Institute of Radiography, 2004a; Doris, 1999; Lauzon, 1999; The Society of Radiographers, 2004). The Society of

Radiographers is currently leading the MRS professions in role extension and many MRS professional associations, including the Australian Institute of Radiography, are now looking towards the United Kingdom as their role model. (Australian Institute of Radiography, 2004a; HENRE, 2004a; Rouse, 2004; The Society of Radiographers, 2004).

In the United Kingdom, the National Health Service aims to have a flexible workforce that can meet the changing and increasing demands for health services (Price, 1997). It is the Department of Health's policy that allocation of duties should be based on merit and ability rather than the traditional demarcation of roles (Hogg, 2004; Masterson & Cameron, 2002). It is on this basis that the role extension has gained increasing prominence among healthcare workers. Role extension refers to practitioners taking on responsibilities beyond their existing roles, with nursing as one profession that has extensively undergone role extension (Cresswell, 2005; Harris & Chaboyer, 2002; Lumby, 2005; Yielder & Sinclair, 2005). In line with the government push for cross boundary roles, changes to legislation and National Health Service regulation are underway in 2005 to allow a number of allied health practitioners to assume responsibilities beyond their current prescribed roles (Department of Health, 2005b). Radiographers are now issued limited prescribing rights and radiation therapists are counselling patients thus providing for role extension (Department of Health, 2005b; Masterson & Cameron, 2002; Snaith, McGuinness, & Yunis, 2004b). Other examples of role extensions include radiographer-performed barium enemas and Accident & Emergency plain film reporting with the reporting radiographer assuming the responsibility of referring or discharging the patient, both duties that were traditionally being performed by radiologists (McKenzie, Mathers, Graham, & Chesson, 1997; Royal College of General Practitioners, 2004; Snaith et al., 2004b).

Reasons for the growth of role extension for MRS practitioners in the United States and Australia are similar to those in the United Kingdom, namely, shrinking health budget, increasing demand for diagnostic and radiation therapy services with a shortage of medical staff, aging population and changes in health legislations to bring about greater efficiency in healthcare delivery (Baume, 2002; Duxbury, Eddy, & Doughty, 2004; Kolmannskog & Hembise, 2003; McCall, 2002; Piper, Paterson, & Godfrey, 2005; Snaith et al., 2004a; Valkenburg, Lopatofsky, Manuel, & Brown, 2000). In the United States, formalisation of radiographers' role in film reporting and gastrointestinal fluoroscopy examinations is via the creation of a radiology assistant. (Valkenburg et al., 2000). Across Europe, role extension is

much more varied depending on cultural factors and the number of healthcare professionals available (HENRE, 2004b; Kolmannskog & Hembise, 2003).

In Australia, the 2005 *Productivity Commission Issues Paper* explores several issues regarding Australia's healthcare workforce including role extension (Australian Institute of Radiography, 2005b). Role extension was given added impetus in September 2005 when a review by Queensland Health indicated further scope for radiographers' role extension (Hamilton, 2005d). In Australia, role extension is currently focused on film reporting and administration of radio-pharmaceuticals, drugs and contrast media, radiographer-performed barium studies and treatment reviews clinics, patient counselling, limited prescription right for anti-nausea drugs and skin creams for radiation therapists (Australian Institute of Radiography, 2004a, 2005c; Cook, Oliver, & Ramsay, 2004; Egan & Baird, 2003; Field-Boden, 1996, 1997; Hall, Jane, & Egan, 1999; Orames, 1997). Development of the MRS profession in Australia parallels that of the United Kingdom but at a much slower pace. In the United Kingdom, expanded roles have already been formally incorporated into a four-tier career structure within the MRS profession. By 2003, film reporting was already classified as a 'well established' practice with intravenous injection being such a common practice that it was no longer considered part of role development (The College of Radiographers, 2002; 2003, p 9). However, much of the role extensions in Australia, such as film reporting and venepuncture, still occur at an informal level (Australian Institute of Radiography, 2005c).

While it may appear that the issue of role extension is primarily one of education of MRS practitioners, the focus on role extension has uncovered major challenges that are currently confronting the MRS profession in Australia. These challenges include issues related to the MRS workplace culture, MRS professionalism and CPD; issues that individually and collectively, influence practitioners' motivation, willingness and ability to continue learning. This in turn affects practitioners' ability to evolve, and to provide quality healthcare to patients, and will have repercussions for the relevance of MRS practitioners and on their survival in a competitive modern healthcare environment. The challenges facing the MRS profession and associated repercussions will be examined in detail in Chapter 2.

Given practitioners' motivation and ability to continue learning is vital to the survival of the profession, the following section examines the definition of CPD as defined by the Australian Institute of Radiography and College of Radiographers of United Kingdom.

1.3.2 Definition of continuing professional development

With the rapid change in technology, healthcare practitioners are required to upgrade their knowledge and skills regularly throughout their careers in order to deliver healthcare in a safe and competent manner (Brown, 1999; Henwood, 1999; Herson, Sosabowski, & Lloyd, 2000; Jackowski & Akroyd, 2001; Kerka, 1994; Maslin-Prothero, 1997; Smith, 1998; Sparks, 1999, 2000; Walker, 1995). There is general agreement that in order for any profession to remain relevant and to adapt to the changing demands of healthcare, there is a need to assist practitioners to develop lifelong learning attributes and skills that are necessary to prepare for these often unknown challenges (Bowden & Marton, 1998; Candy, 2000; Sim, 2000, 2002). This responsibility to continue learning is also made explicit in most professionals' code of conduct. For example, according to the Australian Institute of Radiography's professional Code of Conduct, "radiographers are responsible for their own professional development to ensure the maintenance of the highest standard of knowledge, skill and attitude" (Australian Institute of Radiography, 2003, p. 3).

The Australian Institute of Radiography defines CPD as the "ongoing maintenance and growth of professional excellence through participation in the learning activities, which are planned and implemented to achieve this for the benefit of participants, patients and the public" (Australian Institute of Radiography, 2004b, p. 25). Traditionally, health professional education focuses solely on the clinical role of practitioners (Titchen & Higgs, 2001). CPD is seen as a structured means of improving the healthcare system by maintaining standards of professional practice (Davies & Nutley, 2000). This explains why the emphasis of CPD programs is on updating practitioners' knowledge and focusing on clinical competence while largely ignoring the development of lifelong learning attributes that are necessary for continuing learning and personal development of practitioners (Jeeawody, 1997; Sim, 2000; Titchen & Higgs, 2001).

The ability of practitioners to evolve professionally and adapt to change is also dependent on their learning competencies (Ball, 2000). There is lack of appreciation that development of learning competencies is an essential part of professional development (Titchen & Higgs, 2001). A quality CPD program therefore should be more than just about advancing clinical competence. It must also assist individuals to enhance their learning competencies with the aim of assisting them to advance clinical practices. The United Kingdom College of

Radiographers' definition of CPD is more inclusive, defining CPD as "the systematic maintenance, improvement and broadening of knowledge and skills and the development of *personal qualities* [italics added] necessary for the execution of professional and technical duties throughout the practitioner's working life" (The College of Radiographers, 1997, p. 13). First, CPD is also about lifelong learning in practice (Hatherly, 2000; Peck, McCall, McLaren, & Rotem, 2000). Second, embedded within this CPD definition is the explicit inclusion of practitioners' development of 'personal qualities' as part of CPD. These 'personal qualities' include the ability to continue learning, which is a prerequisite for role extensions and advancement of professional practice. Hence, aside from clinical competence, it is important for educators to adopt a more holistic approach to CPD by including personal and professional development of practitioners, such as lifelong learning attributes, in CPD programs.

The present study focuses on continuing professional development in Medical Radiation Science; it focuses on how to assist practitioners to develop competencies that will enable them to meet the changing demands of the healthcare system and be adequately prepared for the future. The role of the education provider in assisting practitioners to prepare for the unknown future by designing effective CPD programs is therefore crucial.

Given the proliferation of online learning in universities and the increased accessibility of the Internet, offering CPD online is a viable option (Vergnani, 2005). Online learning offers the flexibility of allowing adult learners to continue working fulltime while pursuing their study (Ryan, Scott, Freeman, & Patel, 2000). More importantly, with current technology, it is now possible to provide learner-centred, authentic and collaborative learning online (Hough, Smithey, & Evertson, 2004; Kearsley, 2000b; Ryan et al., 2000; Weller, 2002). The present study therefore considers an educational framework for CPD for MRS practitioners in an online learning environment. The aims of the study are presented in the following section.

1.4 Aims of study

The study aims to design a CPD educational framework online that can assist MRS practitioners in Australia to meet the changing demands of the healthcare system and be adequately prepared for future professional responsibilities.

The specific aims of the study are:

- to review the literature on learning and teaching theories and to identify the design features of an educational framework for CPD in MRS, taking into account the current challenges confronting the MRS profession;
- to design an online module, based on the educational framework, and pilot the online module with MRS practitioners as part of CPD;
- to evaluate the online module using an appropriate evaluation model;
- to reflect on the effectiveness of the online module in addressing the needs of the MRS profession;
- to explore the viability of such an educational framework, against the current climate of increasing financial constraints and technical infrastructure; and
- to further refine the educational framework in the context of CPD.

However, in order to determine the precise needs of the MRS profession, the researcher must first address three important issues: attributes of MRS practitioners, professionalism and workplace culture. To this end, the study also aims:

- to establish the key attributes that assist MRS practitioners in the performance of current and future roles;
- to collect data on MRS stakeholders' view on professionalism in healthcare professions; and
- to determine the MRS workplace culture in terms of CPD.

1.5 Research questions

The present study seeks to answer the following research questions.

Research Question 1

What are the design features of an educational framework needed for a CPD program to meet the current and future needs of the MRS profession?

(a) How effective is the online learning module, embedded within an educational framework, in addressing the current and future needs of the MRS profession?

(b) Is it possible to address the development of broader lifelong learning attributes, in addition to those that are clinically focused in the MRS profession, in an online learning module?

(c) How does one balance the essential elements of an educationally sound online learning experience against the background of increasing financial constraints and technical infrastructure, and still have a program that is attractive to MRS practitioners and commercially viable for education institutions?

Research Question 2

According to practitioners and Heads of Clinical Departments (HODs), what are the attributes required by practitioners to address the future needs of the MRS profession?

(a) What are the key attributes that assist practitioners in the performance of their current roles?

(b) What are the key attributes that will assist practitioners in the performance of their future roles?

(c) What, if any, are the differences in responses between practitioners and HODs?

Research Question 3

What are MRS personal perceptions of themselves as professionals?

(a) What are practitioners' and HODs' perceptions of the MRS profession in relation to other health professions?

(b) How, if at all, do perceptions differ between practitioners and HODs?

(c) Does the level of perceptions of MRS professionalism impact on MRS practitioners' ability to deliver the best possible healthcare?

Research Question 4

In terms of workplace culture, what are the factors that influence MRS practitioners' decisions to engage in CPD?

Research Question 1 focuses on the design features of a CPD educational framework online that meets the current and future needs of the MRS profession. Research Question 1 is in turn supported by Research Questions 2, 3 and 4 which aim to inform the researcher in the design and development of the educational framework. Research Questions 2, 3 and 4 are concerned

with the attributes of MRS practitioners, professionalism and the MRS workplace culture respectively.

1.6 Significance of study

The present study is timely as CPD is one of the main foci of the MRS profession, with countries such as United States, New Zealand, Australia and United Kingdom having already moved or moving towards implementing mandatory CPD for MRS practitioners. The study has major significance for MRS stakeholders in terms of CPD in Australia, and therefore has implications for the future of the MRS profession. Instead of focusing CPD on clinical competence, the present study adopts a more holistic approach. It takes into account the personal and professional needs of MRS practitioners, current challenges confronting the MRS profession, the importance of workplace benefiting from practitioners' CPD participation and the increasing financial constraints of education institutions.

Findings from the present study will contribute to the theory and practice of CPD in the MRS profession. It will add to the body of knowledge about CPD in an online learning environment. Specifically, it will inform the theory on the CPD educational framework for the MRS profession. The study also has practical significance for improved CPD outcomes for MRS practitioners, leading to improved practice for the MRS workplace and advancing the MRS profession.

The study addresses key issues currently facing the MRS profession. There have been numerous discussions within the MRS community on professionalism, professional identity and role extension. In 2002, the Australian Institute of Radiography formed a working party with the aim of defining the future directions of clinical practice for radiography and radiation therapy expected in 2012 (Australian Institute of Radiography, 2002). However, in presenting its report to the Australian Institute of Radiography in 2004, the Working Party was unable to solicit from its members the precise level of clinical practice for the foreseeable future (Australian Institute of Radiography, 2004a). Members' inability to come to a consensus on their future roles indicates the level of uncertainty, lack of confidence and lack of direction within the profession, thereby reflecting a larger problem of identity. Thus, instead of

focusing only on the clinical learning needs of practitioners, the current study adopts a more inclusive approach towards MRS practitioners' CPD by taking into account such issues.

Education is about empowerment (Greenwood & Morten, 1998). Providing practitioners with opportunities to develop themselves personally and professionally will empower them to be able to have increased control over their own situations and therefore assume a more proactive role in delivering better patient outcomes and in determining the future of the profession (Greenwood & Morten, 1998). The benefits arising from such CPD learning for individual practitioners will impact on both the MRS workplace and the profession.

The present study forms the first attempt to collate MRS stakeholders' view on professionalism in Australia. Specifically, the study seeks to determine how MRS practitioners see themselves in relation to other health professionals. Although the literature shows MRS practitioners suffer from a lack of professional respect from other healthcare professionals and the public, resulting in low self-esteem (Baird, 1998; Campeau, 1999; Egan & Harper, 2005), to date, there is no national data available on how MRS practitioners view themselves. Having data on MRS professionalism to inform practitioners and the profession is vital, as illustrated by the following email posted in the Australian Institute of Radiography list server:

> ...Some contributors have talked about changing our status in the medical community, but I have not yet seen anyone offer a considered opinion of what the current status is, where and why it is deficient, or how and why they think it needs to be improved. What are you really trying to achieve?...
>
> (Game, 2003)

Data collected on professionalism will be useful in assisting MRS practitioners, both individually and collectively, to examine and reflect on their roles and contributions within the healthcare community. This opportunity represents an important opportunity for the MRS profession to move forward.

Although workplace support and external factors such as mandatory CPD are crucial in encouraging CPD participation, practitioners' desire and motivation to learn is the most important factor (Henwood, 2003). Practitioners who have a positive attitude towards learning and are motivated to learn are likely to benefit most from CPD participation. For practitioners who are likely to resist CPD participation, it is important to break the cycle of de-motivation

and to excite and empower them to want to learn (Henwood, 2003). Designing a CPD program to break the de-motivation cycle and re-igniting practitioners' enthusiasm for learning is a task of immediate urgency. The present study explores the strategies that can be used to engage practitioners in their learning, as well as strategies for bringing about effective CPD learning outcomes for both MRS practitioners and their workplace. In addition, as well as being applicable to other modalities within the MRS profession, the principles and recommendations from the study will be applicable to other CPD programs for health professionals such as nursing, physiotherapy, occupational therapy and chiropractic.

Universities should assume a leading role in shaping health education by contributing towards research that assists in determining the future of the healthcare system (Landesman, 1999). The present study forms part of this much needed research in MRS.

1.7 Overview of thesis

The thesis consists of seven chapters. Chapter 1 details the background and rationale for the study, the aims of the study and the research questions. The chapter concludes with the significance of the study and an overview of the thesis.

Chapter 2 outlines the challenges confronting the MRS profession, by examining the MRS workplace culture, MRS professionalism and CPD. It details the focus of CPD programs for MRS practitioners. This is followed by a literature review of the role of technology in online learning and relevant learning and teaching theories online, culminating in the design features of an educational framework underpinning the CPD program to be used in the study. An overview of evaluation models to assess the effectiveness of educational programs and the rationale for the chosen evaluation model forms the final section of this chapter.

Chapter 3 provides an overview of the research methodology used in the study. It presents the reasons for adopting action research, outlines the two phases of the study and delineates the quantitative and qualitative approaches employed here. The issue of validity and reliability of data are also addressed.

Chapter 4 reports on the results and interpretations of the data collection in the 1st phase of study and answers Research Questions 2 to 4. Analysis of this data informs and guides the final design and development of the educational framework. It reframes and refines Research Question 1. Chapter 4 therefore sets the stage for the implementation of the educational framework.

Chapter 5 details the 2nd phase of the study, the implementation of the online module, embedded within the proposed educational framework, via the cyclical process of action research. A general discussion of the learning outcomes and effectiveness of the online module, as defined by the chosen evaluation model, concludes the chapter.

Chapter 6 explores the implications of the findings described in Chapter 5, in relation to Research Question 1. The chapter concludes with recommendations for the educational framework, the MRS workplace, and the MRS profession.

Chapter 7 outlines the strengths, significance and limitations of the study, presents suggestions for future research and provides a summary of the study.

Chapter 2

Literature Review

2.1 Focus of current study
2.2 Overview of chapter
2.3 Challenges confronting Medical Radiation Science Profession
- 2.3.1 Medical Radiation Science workplace culture
- 2.3.2 Professionalism of Medical Radiation Science
- 2.3.3 Continuing professional development in Medical Radiation Science

2.4 Design of educational framework underpinning Medical Radiation Science online Continuing Professional Development program
- 2.4.1 Reflection as the focus of the Continuing Professional Development
- 2.4.2 Online learning and Continuing Professional Development
- 2.4.3 Review of current learning and teaching theories
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2.5 Evaluation of online module and educational framework
- 2.5.1 Evaluation biases
- 2.5.2 Evaluation models
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2.6 Educational providers for Continuing Professional Development
2.7 Summary of Chapter 2

2.1 Focus of current study

Modernisation of health services and rapid changes in healthcare systems require health practitioners to constantly adapt and change in order to be able to provide continuous quality healthcare to patients. As part of modernisation of health services, MRS practitioners along with other health professionals, are expected to assume increased responsibilities beyond their current prescribed roles. This implies that practitioners must have the capabilities to continue learning. However, much of the focus on CPD in MRS is directed solely at improving clinical competencies of practitioners, with little emphasis on assisting practitioners to develop the attributes that are necessary for continuing learning and advancing clinical practice (Gold, Rodgers, & Smith, 2002; Sim, 2000). To compound the situation, the MRS profession faces several challenges that threaten practitioners' motivation, willingness and ability to learn.

In view of this, the present study responds to the need to have a holistic approach towards CPD; an educational framework for CPD that takes into account the current challenges confronting the MRS profession in Australia. The present study focuses on designing an educational framework for CPD, based on learning and teaching theories and maximises current technology in online learning. An online module, based on the educational framework, was piloted twice and evaluated. In evaluating the module and learning outcomes, particular attention was directed at the extent to which the module addressed the current challenges confronting the MRS profession, impact on the MRS workplace, and the extent of success in developing the personal and professional attributes of participating practitioners that are a precursor to advancement of clinical practice.

2.2 Overview of chapter

The following section details the challenges that currently confront the MRS profession in Australia, challenges arising from MRS culture, MRS professionalism and CPD in MRS. The impact of these challenges on practitioners' ability to learn, their ability to adapt to the rapidly changing healthcare environment and the corresponding repercussions if these issues are not addressed are explored. Based on the challenges confronting the MRS profession, the focus of the CPD program is presented. The design of the educational framework underpinning CPD programs commences with an overview of the reasons for the proliferation of online learning in universities. A literature review on relevant learning and teaching theories online, the role of technology in online learning, and the instructional framework to be adopted in the present study are discussed. Following the literature review, the design features of the educational framework underpinning the online CPD program are presented. This is followed by a review of evaluation models and the rationale for adopting the Kirkpatrick evaluation model in the present study. The chapter concludes with an examination of the competitive nature of education, focusing on current educational providers for CPD.

2.3 Challenges confronting Medical Radiation Science Profession

This section explores the challenges that currently confront the MRS profession. Specifically, issues arising from the MRS workplace culture, MRS professionalism, and CPD in MRS are

considered, and how the identified issues pose as challenges to the MRS profession are examined. The repercussions, if these challenges are not addressed, are also discussed.

2.3.1 MRS workplace culture

In terms of workplace culture, issues such as practitioners' focus on clinical competence, strict adherence to protocols and lack of functional autonomy have, individually and collectively, adversely impacted upon MRS practitioners' motivation, willingness and ability to learn.

A national study on lifelong learning in the MRS profession provided some worrying signs in terms of practitioners' ability to continue learning (Sim, 2000). Findings from the 2000 study supported by MRS literature indicated that the majority of MRS stakeholders viewed clinical competency as the most important attribute, to the exclusion of all other attributes, with MRS practitioners regarding clinical competency as the sole criterion for excellence (Baird, 1998; Campeau, 1999; Sim, 2000). But it is not enough for MRS practitioners to be solely clinically competent (Sim, 2002; Verkerk et al., 2004). This is because clinical competence can only ensure practitioners are able to maintain proficiency in their current responsibilities. Without the attributes that can bring about continuing learning, the knowledge and skills of most practitioners would remain stagnant.

Modernisation of health services provides a work environment that promotes learning, an evidence-based practice culture that encourages effective teamwork, cross-discipline involvement and skills-mix amongst practitioners (Embleton, 1999; The College of Radiographers, 2002). Candy and his colleagues define a lifelong learner as one who has a positive image of him/herself, a confident self-directed learner with a range of learning skills that will enable him or her to continue learning. Driven by an inquiring mind, the lifelong learner adopts a helicopter vision instead of compartmentalised view of learning (Candy, Crebert, & O'Leary, 1994). Without these lifelong learning attributes, specifically confidence as a learner, the ability to direct own learning, the ability to adopt appropriate learning strategies, and the ability to have an open mind, MRS practitioners are unable to draw upon the latest literature, unable to adopt evidence-based approaches and unable to direct their own learning to ensure continuous improvement of services for the patients. This will in turn

impact upon their ability to continue learning and to deliver best quality care to patients (Sim, 2000).

Another factor that deters practitioners from paying sufficient attention to lifelong learning attributes is the current MRS workplace culture of strict adherence to protocol (Sim, 2000). Much of the work in both radiography and radiation therapy are protocol-driven (Evans, 1999). Protocols exist to assist good practices, but blind adherence to protocol without understanding indicates that practitioners are merely 'followers' and not 'thinkers' (Sim, 2002, p. 4). Advancement of workplace practices is only possible if practitioners are encouraged to question and reflect (Rooda & Nardi, 1999). The emphasis on productivity and the fast pace of work in the MRS workplace do not permit students to question, neither do practitioners pause to question and reflect (Sim, 2000, 2002). A workplace culture that does not promote critical thinking stifles an inquiring mind and inhibits the development of new and better practices (Sim, 2000). MRS practitioners who do not see critical thinking and reflection as essential learning attributes will ultimately have their ability to advance workplace practices affected.

Another reason for MRS practitioners' lack of enthusiasm for learning competencies is the tightly defined functional autonomy of MRS practitioners. Despite the rapid advancement of technology, MRS practitioners' responsibilities have remained relatively unchanged for the past few decades. The medical dominance of radiologists and oncologists has curtailed MRS practitioners' functional autonomy (Baird, 1998; Campeau, 1999; Shephard, 2000; Witz, 1992), resulting in clinically competent practitioners but not reflective practitioners. MRS practitioners' confidence is restricted to their prescribed roles, but they lack the necessary confidence to venture beyond their tightly demarcated responsibilities. Since practitioners are not expected to explore and question clinical practice, they are accustomed to operating within a safe environment where they are not being held personally responsible (Argyris, 2004, p. 22). This lack of confidence partly accounts for their unwillingness to embrace role extension. Although such a workplace culture promotes development of competent practitioners, it will not lead to empowered practitioners (Argyris, 2004). To this end, reflection holds the key to empowering practitioners and lifting them from their apathy (Ghaye & Lillyman, 2000).

Collectively, the MRS workplace promotes a culture of conformity and discourages practitioners from reflection and critical thinking, both essential attributes for continuing

learning and advancing workplace practices. With a workplace culture that focuses on clinical competence, protocol adherence and low functional autonomy, learning competencies have been given little emphasis; thereby adversely affecting MRS practitioners' willingness and motivation to continue learning. Given that "the foundation for future professional competence seems to be the capacity to learn how to learn" (Schein, 1972 as cited in Argyris & Schön, 1974, p. 157), any effective CPD program must include learning competencies as a professional development goal in order to address MRS practitioners' learning deficiencies.

2.3.2 Professionalism of Medical Radiation Science

Professionalism, professional identity and role extension are current discussion topics within the MRS community. MRS practitioners are reported to have very low self-esteem with low public profile resulting in widespread apathy within the MRS profession (Australian Institute of Radiography, 2004a; Campeau, 1999; Egan & Harper, 2005; Maree et al., 2001). This raises the question of whether MRS is a profession in its own right. To this end, the researcher will examine the definitions of 'profession', 'professionalism' and 'professionalisation' and how MRS stands in relation to each. A better understanding of MRS current professional status will enable the researcher to devise strategies to address the challenges of low self-esteem and apathy currently confronting the MRS profession in Australia.

Freidson defined profession as being "synonymous with 'occupation'" (Freidson, 1994, p. 200) while Larson indicated that profession refers only to those "occupations with special power and prestige" (Larson, 1977, p. x). Millerson (1973) identified two approaches in which an occupation can be recognised as a profession; first, via working towards a set of attributes that defines a profession; second, by providing evidence of professionalisation; indications that "an occupation is making efforts to achieve recognition as a profession" (Millerson, 1973, p. 2). The first approach of comparing attributes is a convenient way of classifying a profession (Millerson, 1973). However, this approach is complicated by a lack of consensus on the attributes that define a profession (Freidson, 1986, 1994; Jackson, 1970; Johnson, 1972; Larson, 1977; Millerson, 1973). Moreover, the standard attributes are often modelled on established professions such as medicine and law, and therefore fail to take into consideration the cultural and societal differences that are often associated with the emergence of a new profession (Millerson, 1973).

Given the above drawbacks, a double-pronged approach is adopted to address the question of whether MRS is a profession. The first part consists of examining the set of attributes of the MRS profession and the second part of investigating MRS professionlisation. Aside from attributes, professionalisation also serves as an important means of determining if an occupation fits the criteria of a profession (Harries-Jenkins, 1970; Jackson, 1970). Professionalisation is a dynamic process (Millerson, 1973). In these days of rapid and constant economical and societal changes, even established traditional professions such as medicine and law have to evolve continuously to maintain their status quo.

Attributes of Medical Radiation Science profession

Since the industrial revolution, with the emergence of new occupations claiming professional status, there are increasing ambiguities in what constitute a profession (Freidson, 1994; Jackson, 1970; Johnson, 1972). Despite the varied definitions, there is general agreement that the basic traits of a profession are a possession of specialised knowledge which can be acquired only thorough higher education; representation via a professional organization; a distinctive code of professional conduct; autonomy; and altruism (Ellis & Hartley, 2001; Jackson, 1970; Johnson, 1972; Larson, 1977; Millerson, 1973; Norcutt & Dutton, 1997).

In terms of the basic traits listed above, except for autonomy and altruism, MRS has demonstrated most of the fundamental traits of a profession. Australia is one of the first countries to set the minimum entry into the MRS profession via a higher degree qualification (Cowell, 1999). Both radiographers and radiation therapists possess a set of specialised knowledge and skills, which they use to serve the community. The Australia Institute of Radiography, the official professional organisation representing radiographers and radiation therapists in Australia, has a Code of Practice that guides the professional conduct of radiographers, radiation therapists and sonographers. Enshrined in this professional code of conduct is the welfare and safety of patients (Australian Institute of Radiography, 2003).

The current healthcare system, which operates in a climate of transparency, accountability and reduced healthcare cost, does not permit total autonomy of any professional group (Ellis & Hartley, 2001). Thus, one might argue that the autonomy of any professional group is relative, with one having more dominance over another. In Australia, allied healthcare groups such as nursing, radiation therapists and radiographers, do not have total functional autonomy as their functions revolve around supporting the medical profession (Egan & Harper, 2005; Freidson,

1970). Medical dominance has ensured that radiographers and radiation therapists remained subordinate to both radiologists and oncologists (Baird, 1998; Campeau, 1999; Shephard, 2000; Witz, 1992). In Australia, this supervision clause was reinforced again in the 2004 Medical Imaging Services accreditation document (National Association of Testing Authorities, 2004). As such, any role extension will be closely monitored and regulated by the medical profession, ensuring the continuation of MRS practitioners' limited functional autonomy.

Altruism has been identified as an important attribute that distinguishes a profession from other occupations (Johnson, 1972). It is the professional's responsibility to place the well-being and the interest of clients before their monetary gain (Freidson, 1994). However, for the MRS profession, the focus on self-interest amongst members was prevalent in the findings reported by the Working Party in 2004. In trying to determine the level of clinical practice for the future, the Working party found the "classic WIIFM syndrome or 'what's in it for me?'" to be prevalent amongst members (Australian Institute of Radiography, 2004a, p. 14). Although it has been noted that many professions failed for similar reasons (McGhee, 1995), the reluctance amongst MRS members to assume increased responsibilities for the benefit of patients and the wider community is a point of concern.

Professionalism refers to the "conduct, aims or qualities that characterise or make a profession" (Campeau, 1999, p. 179). In terms of qualities, apart from autonomy and altruism, the MRS profession shows evidence of possessing all the basic attributes of a profession. In terms of conduct, one has to examine the ongoing process of MRS professionalisation and this is explored in the following section.

Professionalisation of Medical Radiation Science profession

Professionalisation is the "dynamic process whereby many occupations can be observed to change certain crucial characteristics in the direction of a profession (Vollmer and Mills, cited in Johnson, 1972, p. 22). In this section, the researcher will explore three characteristics of professionalisation: growth of professional knowledge; practitioners' willingness to assume responsibility as a health professional, be it in the form of voluntary CPD participation and role extension; and the profile of the MRS profession.

An important aspect of professionalisation is the continuous growth of professional knowledge as a result of ongoing research conducted by members of the profession (Cowell, 1999; Ellis & Hartley, 2001; Scutter & Halkett, 2003). There is increasing emphasis for healthcare practitioners to undertake research with the aim of improving service to their patients (Lyons, 1999; Pearson & Jones, 1997; Smith, 1998). Traditionally, much of MRS knowledge has been the result of research conducted by physicists and medical practitioners (Adams & Smith, 2002; Challen, Kaminski, & Harris, 1996; Law, 2004; Nixon, 2001). In Australia, with the commencement of degree entry for the MRS profession in the late 1980s and early 1990s, MRS practitioners are now expected to engage in research that will inform their practice (Adams & Smith, 2002; Reeves, Wright, Shelley, & Williams, 2004; Williams, 2002). However, little research is being conducted by Australian MRS practitioners and Australia is not alone in this (Doug McGhie and Associates, 2000; Scutter & Halkett, 2003). In the United Kingdom, research does not form an integral part of MRS professional practice (Reeves et al., 2004; The Society of Radiographers, 2001). Reasons cited for this lack of research involvement include lack of confidence and understanding in undertaking research, lack of time, and lack of financial support from MRS employers for practitioners to pursue research. Other reasons include poor attitude towards research and practitioners' resistance to change (Challen et al., 1996; Nixon, 2001; Scutter & Halkett, 2003; Sim, 2000). Thus, while research provides the legitimacy for clinical practice and forms one of the important criteria of professionalism (Hammick, 1995), the fact remains that the body of professional knowledge for both radiography and radiation therapy remains relatively stagnant due to the paucity of research.

Another important element of professionalisation is practitioners' willingness to assume responsibility as a health professional. This includes the intellectual interest a practitioner has in his or her work and interest in further extending the work (Freidson, 1994). According to this criterion, engaging in CPD and role extension are two areas MRS practitioners should actively pursue as part of their professional responsibilities. To this end, the researcher will rely on the current CPD participation rate and the status of role extension to determine the extent of MRS professionalisation in terms of practitioners' willingness to assume increased responsibility as a health professional.

As of January 2005, the Australian Institute of Radiography took the lead by making CPD mandatory for its members and linking CPD fulfilment to renewal of the statement of

accreditation (Australian Institute of Radiography, 2005a; Hamilton, 2005c). At present, participation by non-members of the Australian Institute of Radiography in the CPD program is optional. Prior to implementation of mandatory CPD in 2005, only 31% of members participated in voluntary CPD programs (Brown, 2003a). As of November 2005, the national compliance rate for mandatory CPD stood at 20% (Hamilton, 2005d, p. 5). Although the number of MRS practitioners nationwide who informally engaged in CPD activities is likely to be much higher than the stipulated 20%, the CPD participation rate does not provide a promising national picture of MRS practitioners actively engaging in CPD. Another worrying trend is reflected in a 2003 study conducted by Scutter and Halkett (2003). MRS practitioners surveyed indicated that they have no time to read journal articles, either at work (80%) or at home (64%). This lack of commitment to pursue CPD activities in practitioners' own time was also reflected in a 2004 joint study between the United Kingdom and New Zealand (Henwood, Yielder, & Flinton, 2004). Although the study by Scutter and Halkett was restricted only to radiation therapists in a large public teaching hospital, the findings together with the latest CPD figures and practitioners limited involvement in research and publication, paints a picture of limited participation amongst MRS practitioners in areas of CPD and research. In enhancing professional competence and advancing clinical practice, there must be individual and collective commitment by practitioners towards CPD (Noon, 1994). These findings noted above reflect a lack of commitment on the part of MRS practitioners to continue learning, which is part of the responsibility of being a health professional.

The majority of the Australian Institute of Radiography members do not see advancing workplace practices as part of their professional responsibilities (Australian Institute of Radiography, 2004a). The issue of role extension has exposed MRS practitioners' unwillingness to assume increased responsibility in clinical practice; preferring instead to have others, such as clinicians and radiologists assume responsibility on their behalf (Australian Institute of Radiography, 2004a). The Working Party was met with a "fair level of cynicism … that it [role expansion] would not be allowed" (Australian Institute of Radiography, 2004a, p. 15). In particular, senior practitioners, who have been in the workforce for more than 15 years, were reported to be dampening the enthusiasm of younger practitioners by insisting that role expansion "will never happen, we don't want to change, we have tried this before, it won't happen for you, this is our lot in life" (Australian Institute of Radiography, 2004a, p. 15). One possible reason for this resistance to change, especially from the older practitioners who qualified under the diploma scheme, may be due to their fear of

change and feeling less well prepared than their degree colleagues. As a result, they resorted to reaffirming the "historical expectations embedded in the way work is organised and allocated" in an attempt to keep the status quo (Bull, 2003b, p. 6). This indicates an urgent need to assist the existing workforce, especially the 'older generation' to prepare for change. MRS practitioners' unwillingness to embrace role extension reflects a failure to assume increased clinical responsibility, evidence of yet another obstacle to professionalism.

Public profile and recognition of professional status is another important aspect of professionalisation (Burnard & Chapman, 2004; Freidson, 1970; Turner & Hodge, 1970). This is because the standing of a profession in society is ultimately dependent on the assessed value by both the users and non-users (Millerson, 1973). The reported low public profile and lack of professional recognition from healthcare professionals gave rise to two other major challenges confronting the MRS profession; low self-esteem and widespread apathy amongst MRS practitioners (Australian Institute of Radiography, 2004a; Baird, 1998; Egan & Harper, 2005). Unlike nurses and doctors whose functions are well understood by the public, the professional roles of MRS practitioners are unclear and lack recognition by the public (Campeau, 1999; Cherry, 1995; Egan & Harper, 2005; Maree et al., 2001). From the researcher's personal experience, radiographers are often referred as 'button pushers' or more recently, with emerging new technology as, 'high-tech photographers', reflecting a lack of appreciation by other health professionals of MRS practitioners' role in healthcare. As a group, radiographers and radiation therapists traditionally have not commanded recognition and professional respect from other healthcare practitioners, resulting in MRS practitioners having very low self-esteem (Belt, 2000; Bull, 2003a; Campeau, 1999; Collins & Nolen, 2002; Egan & Harper, 2005; Fell, 1999; Greathouse, 1999; Henwood, 2000a; Hollingworth, 2003; Shephard, 2000; Walther, 1999). The main reason for MRS practitioners' low self-esteem is their own lack of appreciation of their contribution in healthcare (Campeau, 1999; Walther, 1999). This low self-esteem was also reported by the Working Party. "… as a group we harbour a significant inferiority complex…there is a tendency to de-value our role in the care and treatment of the patient, more so in the diagnostic field than in the therapy field " (Australian Institute of Radiography, 2004a, p. 14). These challenges, if left unchecked, would have an adverse impact on MRS practitioners' willingness and motivation to engage in continuing learning.

MRS practitioners have demonstrated that, aside from autonomy and altruism, their professional attributes fit the common criteria of a profession. However, in terms of MRS professionalisation, the evaluation provides a more problematical picture. MRS literature shows that MRS practitioners are not doing well in terms of consolidating their professional status. There is a lack of commitment towards CPD participation and unwillingness to accept increased clinical responsibility; professional knowledge remains relatively stagnant due to the lack of research; low self-esteem, apathy and the defeatist attitude of "this is our lot in life" are entrenched amongst MRS practitioners (Australian Institute of Radiography, 2004a, p. 15). However, "critical to any profession is its ability to grow and change as the world changes" (Ellis & Hartley, 2001, p. 160). Thus, urgent strategies must be implemented to address the challenges of apathy, low self-esteem, lack of motivation and willingness to learn. Failing to address these challenges will have severe repercussions for MRS practitioners' ability to advance clinical practices, to provide better patient outcomes, and ultimately, will call into question the relevance and survival of the MRS profession.

In conclusion, as opposed to the established group of professions such as doctors and lawyers; the MRS profession belongs to the emerging group of professionals who are battling with their low status and struggle to be recognised as a profession (Freidson, 1994; Johnson, 1972). CPD is an essential component of professionalism and healthcare service (Guest, 2005a; Nag, 1999). In view of the MRS struggle towards professionalism and a workplace culture that promotes conformity with little emphasis, if any, on learning competencies, CPD is vital in assisting MRS practitioners and profession towards achieving true professional status. The following section examines the status of CPD in MRS in Australia and the extent in which MRS practitioners support CPD.

2.3.3 Continuing professional development in Medical Radiation Science

The ability of MRS practitioners to continue learning in order to adapt to the rapidly changing healthcare environment is crucial (Ellis & Hartley, 2001). CPD is part of this continuing and lifelong learning (Guest, 2005a; Ruscheniko, 1999). CPD is regarded as an agent of change; it is seen as one way of assisting practitioners in continuing learning, acquiring new skills and advancing clinical practice (Henwood, 2003; Henwood, Edie, Flinton, & Simpson, 1998; Houle, Cyphert, & Boggs, 1987; Moores, 2002). Moreover, healthcare practitioners work in an environment of increasing accountability and possible litigation (Mott, 2000). Thus, CPD

is not only about maintaining the competence of practitioners. It should also be about supporting practitioners in their role development and assisting them to assume new responsibilities and to adapt to the constantly changing demands of healthcare (Colyer, 1997; Fell, 1999; Henderson, 1999). "CPD is not an optional extra" (Guest, 2005a, p. 10). Practitioners who are best positioned to meet the future are those who have a positive attitude towards learning and are motivated to learn.

Mandatory CPD

CPD is mandatory for many professions including doctors, nurses, pharmacists, architects, surveyors and lawyers (Fielding, 1996; Haines & Henwood, 1998; Henwood, 2000a; Noon, 1994; You are what you learn, 2002). In the United Kingdom, it is anticipated that the Health Professional Council will require CPD to be a pre-requisite for MRS practitioners' registration sometime in 2005 (Kelly, 2004;White, 2004). The push for mandatory CPD in the United Kingdom was aided by changes in government policies. The United Kingdom *Agenda for Change* has indicated that all health professions will be assessed based on competence and their clinical relevance, rather than simply relying on each profession's traditional roles and status. As such, maintaining and enhancing practitioners' competence becomes crucial (Henderson, 1999). Under the current healthcare system, evidence of CPD participation will be one of the hallmarks of Departmental quality (Beckam, 1997).

In both the United States and New Zealand, CPD is mandatory for radiographers and radiation therapists (Anson, 2005; Norcutt & Dutton, 1997; Reid, 1997). In Australia, CPD is mandatory only for members of the Australian Institute of Radiography (Australian Institute of Radiography, 2005a; Hamilton, 2005c). However, by linking successful CPD participation with the statement of accreditation, the Australian Institute of Radiography is raising the stake for MRS practitioners who are not accredited by a MRS professional association. In a recent response to the Federal government's 2005 *Productivity Commission Issues Paper*, the Australian Institute of Radiography highlighted the existence of a large proportion of clinical centres that has a high percentage of MRS practitioners who do not possess the accreditation statement, thereby failing to provide evidence of CPD (Australian Institute of Radiography, 2005b). The Australian Institute of Radiography argues that mandatory CPD is a means of demonstrating evidence of competence and is one way of ensuring the delivery of quality healthcare (Castle et al., 1997; Henderson, 1999; The Society of Radiographers, 1997). It

recommended that all States consider mandatory CPD as one way of serving the healthcare needs of their populations (Australian Institute of Radiography, 2005b).

Recent developments within the MRS profession in Australia at the national level have added momentum to the mandatory CPD program. These include the National Radiation Oncology Inquiry, the national accreditation of radiology services and the push for role expansion spearheaded by the Australian Institute of Radiography (Baume, 2002; Hamilton, 2005a; National Association of Testing Authorities, 2005).

The National Radiation Oncology Inquiry was created in 2001 to look into problems in radiation oncology service in Australia. The subsequent 2002 report provided four staffing recommendations that have major impact on radiation therapists' CPD in Australia. First, to assist workforce retention, there should be better and more career pathways for radiation therapists. Second, a multi-tiered workforce should be implemented, thereby providing formal recognition of specialised skills. Third, refresher-training courses should be made available to attract 'retired' radiation therapists back into the workforce. Finally, mandatory CPD should be a pre-requisite for national registration (Baume, 2002). Together, these recommendations have given CPD in radiation therapy much-needed momentum. By 2004, ten hospitals in New South Wales had appointed a radiation therapy educator and in 2005, the Department of Health and Ageing have made available federal funding to assist radiation therapists nationwide in CPD participation (Hamilton, 2005b; Sampson et al., 2004).

The ongoing accreditation program to audit radiology services in Australia, conducted by the Royal Australian and New Zealand College of Radiologists and the National Association of Testing Authorities, have indirectly impacted on radiographers' CPD, as, in order to comply with competence standard, radiographers must have the Australian Institute of Radiography statement of accreditation or state registration (National Association of Testing Authorities, 2004). Thus, from the perspective of employers of accredited imaging centres, evidence of CPD participation is now essential for radiographers. It is likely that the Federal Government may in the foreseeable future allow Medicare reimbursement only to accredited imaging centres. It follows that, as more imaging centres get accredited, radiographers will find mandatory CPD participation to be part of their employment and workplace requirement.

Another issue pushing the CPD mandatory agenda is the current focus on role extension. As discussed in Chapter 1 (Section 1.3.1), role extension is a common challenge facing the MRS professional communities in United Kingdom, United States, Europe and Australia (Hamilton, 2005a; Stevenson, 2000). CPD assumes an important role in assisting and preparing practitioners to assume new clinical responsibilities (Castle et al., 1997; Egan & Harper, 2005; Guest, 2005a; Henderson, 1999).

Reactions to mandatory Continuing Professional Development

While modest progress in favour of CPD for MRS practitioners has been made at the national level, reactions to mandatory CPD at practitioners' level has been mixed. In response to the introduction of mandatory CPD, numerous letters were published in support of and against the Institute's decision. One member tendered her resignation in protest of mandatory CPD, seeing the policy as a harsh intrusion. In response, another member wrote in support of mandatory CPD, indicating that CPD, accreditation and registration are inevitable imposition of government, employers and the professional associations (Russell, 2004; Visser, 2004).

The above two responses typify the arguments against and for mandatory CPD. Opponents argue that making CPD mandatory runs against the principle of adult learning and may therefore have a negative impact on learning. There are fears that mass CPD may lead to a deterioration of the quality of learning activities, and mandating CPD brings into focus the issues of CPD costs and accessibility to CPD activities (Bibb, Crowell, Lyon, Miller, & Rybarczyk, 2003; Field, 2004; Henwood et al., 2004; Lowenthal, 1981). Proponents of mandatory CPD maintain that it increases professional exchanges between practitioners and is one way of ensuring clinical competence, thereby increasing public confidence in the profession. CPD is a cost effective way of ensuring effective practice and one way of bringing those who refused to update themselves professionally into the fold (Lowenthal, 1981; Maple, 1987; Walker, 1995).

At the workplace level, support for CPD participation is not high. Staff shortages, increased workload, and reduced healthcare budgets have rendered CPD activities secondary to other more pressing issues (Castle et al., 1997; Colyer, 1997; Egan & Harper, 2005). Equity issues regarding accessibility of CPD activities to remote region practitioners and part-time staff are also important considerations in the climate of mandatory CPD (Castle et al., 1997; Henwood et al., 2004). Thus, despite the progress at the national level, the lack of MRS workplace

support together with the reported widespread apathy and low self-esteem of MRS practitioners pose a challenge in terms of MRS practitioners' support for CPD.

A study by Henwood (2003) shows that radiographers' understanding of CPD is restricted to attendance-based participation activities. Many see CPD participation as the end of the CPD process. They do not have a "holistic concept of CPD", with few equating CPD impact on clinical practice as an essential part of CPD outcomes (Henwood, 2003, p. 11). Radiographers participating in CPD activities have limited expectation on CPD outcomes. Although the study pertained specifically to radiographers in the United Kingdom, it is likely to reflect a similar picture in Australia.

Mandatory CPD puts the issue of CPD participation into focus. For CPD to be a success, the individual practitioner must be willing and motivated to learn (Henwood, 2003). Mandatory CPD alone does not hold the solution to addressing the challenges currently confronting the MRS profession. For CPD to meet these challenges and be accepted by MRS practitioners, CPD needs to focus on reflection, be based on learning and teaching theories and to use technology appropriately to enhance learning online. The next section examines the rationale of using reflection as the focus of the CPD program and explores the educational framework underpinning CPD programs for MRS practitioners.

2.4 Design of educational framework underpinning the Medical Radiation Science online Continuing Professional Development program

Before investigating the design features of the educational framework underpinning the CPD program for MRS practitioners, the researcher will first examine the reasons for using reflection as the focus of the CPD. A review of the relevant learning and teaching theory, the role of technology in online learning and the instructional framework adopted in the present study will follow. Based on the learning and teaching theory and online technology, the educational framework underpinning the MRS online CPD program is presented.

2.4.1 Reflection as the focus of the Continuing Professional Development

Competence should not only include clinical competence; competence should also include a commitment to CPD and professional values (Winter, 1995). As discussed in Section 2.3, MRS practitioners lack the commitment to CPD and the reported widespread apathy and low self-esteem of MRS practitioners is preventing MRS practitioners from assuming increased responsibility as a health professional. The key to addressing low professional self-esteem is empowerment (Bolton, 2001; Ghaye & Lillyman, 2000; Schön, 1983, 1987). Reflection empowers MRS practitioners to move beyond a subservient mindset and their adherence to conformity and to motivate them to continue learning. Traditionally, the focus of CPD programs is on updating practitioners' clinical knowledge (Jeeawody, 1997; Sim, 2000; Titchen & Higgs, 2001). In contrast, this proposed CPD program focuses on reflection and uses clinical knowledge and experience to facilitate participants' reflection, learning competencies, and development of professional expertise.

This section examines the definition of reflection, the different models of reflection, and the purpose of reflection in professional practice and in particular, the reasons for including reflection as part of CPD in MRS. The section concludes with how reflection can be incorporated into a CPD program.

Definition of reflection

Being a professional is a lifelong evolutionary process of learning (Hatherly, 2000). Reflection provides the vital link between the different learning experiences, assisting practitioners to make sense of their learning and their experiences in the workplace (Sugerman, Doherty, Garvey, & Gass, 2000). Reflective practice therefore refers to the act of engaging in reflection (Ghaye & Lillyman, 2000).

Dewey was the first to establish the relationship between reflection and experience (Sugerman et al., 2000). Reflection has been defined as a learning process that enhances a learning experience (Hawkes & Romiszowski, 2001; McLoughlin & Luca, 2003). Dewey defined reflection as an "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (Dewey, 1933, p. 9). Reflection is therefore a conscientious and rational thought process, which relies on evidence as its basis for justification. Reflection is also intentional

and has a goal. Thus, thinking that does not involve any questioning of goals or values does not constitute reflection (Zeichner & Liston, 1996). Non-reflective learning is therefore learning that takes place when the learner simply accepts knowledge without questioning the underlying theories and validity of claims and assumptions (Mezirow, 1990a). Reflection involves assessing the "ground of belief" (Dewey, 1933, p.11). In fact, one of the core functions of reflection is "validating what is known" (Mezirow, 1990a, p. 18) and it is this validation that provides the foundation for an effective healthcare practice (Young, 2002).

Reflecting on one's learning experience requires one to go through a continuous learning cycle, moving between reflecting on the experience and the learning that has occurred (Dewey, 1933). Kolb's experiential learning model also identifies experience as one of the four important phases of learning, with a learner moving through the stages of experience, reflection, generalising and planning (Kolb, 1984). Boud, Keogh and Walker (1985) emphasised the relationship between reflection and experience by defining reflection as "a form of response of the learner to experience" (Boud, Keogh, & Walker, 1985, p. 18). Reflection is the "processing phase … in which people recapture their experience, think about it, mull it over and evaluate it" and is therefore an intentional activity (Boud et al., 1985, p. 19). It follows therefore that only the learner can reflect on one's individual experiences.

While Dewey emphasised that reflection is a tightly controlled and rational thought process, based "upon a firm basis of evidence and rationality" (Dewey, 1933, p. 9), Boud et al. (1985) consider the affective aspects of learning as an essential element of reflection; since both negative and positive feelings can have an impact on learning with negative feelings impeding learning and positive feelings encouraging learners to continue learning and reflecting.

Models of reflection

Schön's epistemology of professional practice has placed reflection high on the agenda of CPD (Cheetham & Chivers, 2000). While building on Dewey's foundational work on reflection, Schön's pioneering work (1983, 1987 and 1991) on reflective practitioners has shaped our understanding of reflection and redefined reflection in professional practice (Hillier, 2002; Schön, 1983, 1987, 1991; Zeichner & Liston, 1996). Schön lamented on the dominance of technical rationality in professional education. Technical rationality refers to the way in which practitioners are expected to use theoretical knowledge, acquired during their pre-professional education, and apply it in well-structured scenarios (Schön, 1987).

However, problems encountered by practitioners in clinical situations are often unpredictable and complex. As such, practitioners are often ill equipped to cope with these. In fact, much of professional knowledge and clinical learning comes from practitioners' responses to the problems encountered in the workplace and most of such practitioners' practice is based on tacit knowledge and experiences (Schön, 1987). This tacit knowledge is often hidden and only surfaces when practitioners reflect on their actions or are confronted with a problem that requires different solutions (Argyris & Schön, 1974, 1978). Thus, while Dewey viewed reflection as a rational process, Schön saw reflection in the workplace as unspoken and instinctive (Cranton, 1996).

Schön described reflection in the context of professional activity. He saw reflection as the process between thinking and action, in that reflection "focus interactively on the outcomes of action, the action itself, and the intuitive knowing implicit in the action" (Schön, 1983, p. 28). Schön popularised the concepts of reflection-in-action and reflection-on-action (Schön, 1983, 1987).

Reflection-in-action involves reflecting on the event while in the midst of action. "Our thinking serves to reshape what we are doing while we are doing it" (Schön, 1987, p. 26). Reflection-in-action creates the knowledge that enables practitioners to work while thinking on their feet, an important attribute of health practitioners (Ghaye & Lillyman, 2000). The role of reflection-in-action is crucial as it assists practitioners to question their basic assumption on their work practices (Schön, 1987). Schön labelled such basic assumptions as knowing-in-action. Knowing-in-action is "tacit, spontaneously delivered without conscious deliberation; and it works, yielding intended outcomes so long as the situation falls within the boundaries of what we have learned to treat as normal." (Schön, 1987, p. 28). Reflection-in-action therefore, serves as a mirror informing practitioners of their level of knowing-in-action (Ghaye & Lillyman, 2000). The main feature that sets reflection-in-action apart from other types of reflection is that the reflection-in-action often results in the practitioners' immediate implementation of actions that lead to further changes (Schön, 1987).

Reflection-on-action refers to "thinking back on what we have done" (Schön, 1987, p. 26). Reflection-on-action is retrospective and it enables practitioners to reflect back on an experience or event, usually with the aim of explaining an unexpected outcome (Schön, 1987). It is about "making sense of practice" and it can occur at a personal level or in the

public as a reflective dialogue (FitzGerald & Chapman, 2000; Ghaye & Lillyman, 2000, p. 7). Killon and Todnem added another term "reflection-for-action". Here, thought occurs before action, and it is the kind of reflection that takes place to guide future practice (Killion & Todnem, 1991).

In summary, Schön argued that the conventional view of professional practice, which relied on practitioners simply applying theoretical knowledge acquired during their preparatory education, is inadequate. Rather, professional practice, against the backdrop of ill-defined and confusing problems, is dependant on knowing-in-action (basic assumptions and tacit knowledge) and reflection (reflection-in-action and reflection-on-action) (Schön, 1983, 1987). Schön called this form of professional practice, professional artistry. Reflecting on professional artistry, allows practitioners to confront and question their understanding and values. This in turn, results in practitioners advancing their work practices and empowering them to want to change (Bolton, 2001; Schön, 1987). Although criticism has been levied at Schön's conception of reflective practitioner as overly individualistic, Schön's legacy lies in enhancing and redefining reflection in professional practice (Hillier, 2002; Zeichner & Liston, 1996).

What Schön has highlighted is that professional education should aim to enhance practitioners' ability to reflect, since reflection is the means by which all other competencies are learned. The acquisition of theoretical knowledge is still important as this knowledge informs and provides practitioners with the foundation for their practical knowledge (FitzGerald & Chapman, 2000). Learning can be enhanced by using reflection to assist practitioners in framing and reframing the problems (Schön, 1987). In the process, reflection develops the kind of knowledge that is workplace specific and that informs practitioners about current and future workplace practices (Cheetham & Chivers, 1998; Killion & Todnem, 1991). Thus, according to Schön, reflection should form one of the main learning competencies of practitioners.

Types and levels of reflection

There are different classifications of reflection, just as there are various types of learners who reflect. Reflection has been classified as ranging from lower level to higher level. Lower level reflection refers to reflection on technical matters, with mid-level reflection revolving around validating presuppositions and the highest level of reflection involving reflecting on moral,

ethical and political issues (Van Manen, 1997). Mezirow (1991) similarly categorised reflection as content reflection (lower level), process reflection (mid-level) and premise reflection (highest level).

In the same way, learners can be classified as non-reflectors, reflectors or critical reflectors (Wong, Kember, Chung, & Yan, 1995). Non-reflectors are those who engaged only in content reflection by describing learning incidents in descriptive terms with no evidence of reflective thinking. Reflectors are those who experience process reflection while critical reflectors are those who have experienced change in perspective as a result of premise reflection (Mezirow, 1990b; Wong et al., 1995). Given that one's experiences play such a crucial role in learning, it is important that learners should be in control of such "experiences rather than be controlled by them" and being in control is made possible by "becoming reflective of the content, process and especially the premises of one's prior learning" (Mezirow, 1990b, p. 375).

Given the complexity of reflection, numerous models of reflection have been proposed by various researchers in an attempt to contextualise and facilitate reflection. A reflective model has two main functions. First, it describes how the reflection process develops by depicting the different elements of reflections. A reflective model that is contextualised for a specific profession can therefore be used to guide practitioners in their reflection process, thereby facilitating the development of practitioners' reflective practice (Bulman, 2000; Burnard, 1991; Cranton, 1996; Ghaye & Ghaye, 1998; Mezirow, 1981). Second, by defining the level and criteria of the reflection process, a reflective model is commonly used as a framework to assess the level and quality of reflection (Jay, 2003; Tate, 2002).

One such reflective model is that proposed by Boud, Keogh and Walker (1985). Boud et al. proposed a generic framework of reflection that describes six levels of reflection processes learners might experience. Returning to experience involves describing the activities, an essential step of recounting past experiences so that subsequent reflections are based on actual recollection of events. Attending to feelings (1st level) recognises the importance of feelings in facilitating or obstructing the learner's learning experience since "utilizing our positive feelings is particularly important as they can provide us with the impetus to persist in what might be very challenging situations" (Boud et al., 1985, p. 29). Allowing learners to articulate their feelings assists them in understanding their emotions in the learning context, an important characteristic of the self-directed learners (Patterson, Crooks, & Lunyk-child,

2002). The 2nd to 5th levels consist of association, integration, validation and appropriation. Association (2nd level) refers to relating new knowledge to pre-existing understanding, integration (3rd level) involves synthesising old and new data, while validation (4th level) is "testing for internal consistency" including the testing of new concepts (Boud et al., 1985, p. 32). Finally, appropriation (5th level) involves internalising knowledge into one's cognition. These levels do not necessarily occur in sequence, neither do learners need to experience each level of reflective process described. In fact, validation and appropriation, which form the higher level of reflective process, could also be viewed as a form of reflective outcomes (Boud et al., 1985). Reflection outcomes (6th level) ranged from changes in behaviour (action outcomes), changes in the learner's affective state (affective outcomes) and/or perspectives (perspectives outcomes) (Boud et al., 1985).

Perspectives outcomes, or perspectives transformation, are also known as transformative learning (Brookfield, 2000; Mezirow, 1990c). Transformative learning is "the process of becoming critically aware of how and why our presuppositions have come to constrain the way we perceive, understand and feel about our world" (Mezirow, 1990a, p. 14). Transformative learning "involves a fundamental questioning and reordering of how one thinks or acts" (Brookfield, 2000, p. 138) and "learning includes acting on these [new] insights" (Mezirow, 1990c, p. xvi). Acquiring a deeper understanding in itself does not constitute transformative learning. Transformative learning requires a major shift in one's basic assumption and a consequent change in perspective and personal paradigm (Brookfield, 2000; Mezirow, 1991). According to Mezirow's theory of transformative learning, critical reflection is a precursor to transformative learning. However, critical reflection by itself does not necessarily lead to transformative learning. This is because critically reflecting on one's own assumption must first take place before any change of perspective can take place (Brookfield, 2000; Cranton, 1996; Mezirow, 1990a).

Transformative learning can also be seen as part of a developmental process of reflection (Cranton, 1996). Transformative learning involves changing perspectives and acting upon these new perspectives (Brookfield, 2000; Mezirow, 1990c). Empowerment and transformative learning are interlinked. This is because empowerment alone is insufficient to bring about a significant change in CPD participants. In order for the empowerment to occur and for professional development to be meaningful and enduring, transformative learning is needed and should therefore form part of CPD learning outcomes (Gamble, Chan, & Davey,

2001; Harvey & Knight, 1996). While some view transformative learning as part of CPD learning outcome, Daley (2000) maintains that transformative learning is an essential part of the knowledge construction process, as professionals often change their knowledge and understanding of issues via a critical incident that transforms their perspectives. Regardless of whether transformative learning should be part of knowledge building or form part of learning outcome, Mezirow (1990b; 1991, p. 224) maintains that it is the "cardinal function" of adult educators to encourage critical reflection and facilitate transformative learning amongst the adult learners.

Critical reflection requires one to reflect on the political and social dimensions, to challenge "the validity of presuppositions" and to question the status quo of what used to be the accepted norm (Brookfield, 2000; Mezirow, 1990a, p. 12). Thus, critical reflection is more than simply problem-solving technical issues (Cranton, 1996). To critically reflect is to go beyond the questioning and reframing phase. Critical reflection is not about what and how; it is about why, and the consequences of acting upon the new perspectives (Mezirow, 1990a). Critical reflection is an important form of reflection as it assists practitioners to develop "new ways of being a professional" (Gamble et al., 2001, p. 121). Given the historical, political and cultural context of the MRS profession, critical reflection and transformative learning will prove to be an effective way of facilitating MRS practitioners' quest for professional identity.

Hence, reflection has its risks. Reflection can be risky since challenging or questioning of one's own practice puts the practitioner in a vulnerable position (Ghaye & Lillyman, 2000; Hillier, 2002). This is especially true when the issues discussed are political, social or ethical, subjecting participating practitioners to a higher level of personal or professional risk (Bolton, 2001). The self-evaluation process may also lead to a range of negative emotions such as frustration, despair, fear or disgust. Another outcome of reflection may be confrontation in the workplace. Public expression of one's reflection may result in disagreement at the workplace and may lead to awkward situations for some (Ghaye & Lillyman, 2000). Hence it is important that reflection, be it at an individual or group level, is effectively facilitated and conducted in a safe and supportive learning environment (Bolton, 2001; Boud et al., 1985; FitzGerald & Chapman, 2000; Hawkes & Romiszowski, 2001).

In the present study, Boud et al.'s (1985) model of reflection is used in the development of the CPD educational framework. Their model of learning from experience involves practitioners

recounting their clinical experiences and recognising the importance of affective aspects of learning. As part of the reflective learning process, the model includes various levels of reflections ranging from association, integration, validation and appropriation. It is this reflective learning process that makes possible the creation of new clinical knowledge and expertise (Gamble et al., 2001). This learning process is as important as the reflection outcomes since this process equips healthcare practitioners with the ability to solve practical problems (FitzGerald & Chapman, 2000). Finally, the inclusion of three categories of reflection outcomes namely, action, affective and perspective transformation, takes into account the wide-ranging outcomes that are possible from reflection.

Purpose of reflection in professional practice

Reflection is widely promoted amongst health professions, such as nursing, medicine, pharmacy, physiotherapy, occupational therapy, education and social work, as an effective form of professional development (Bolton, 2001; Clouder, 2002; Geissler, 2002; Ghaye & Lillyman, 2000; Killion & Todnem, 1991; Young, 2002).

There are several reasons why reflection is widely accepted amongst health professions and in professional education. Reflection is a versatile, dynamic and critical process of learning, it helps contextualise learning, and is applicable in the real world of complex and ever changing situations (Bolton, 2001; FitzGerald & Chapman, 2000; Heath, 2002). Reflection has been described as “a process of learning and developing through examining our own practice, opening our practice to scrutiny by others” (Bolton, 2001, p. 4). By combining practitioners’ mindset of work with clinical skills and reasoning, reflection provides the opportunity for practitioners to examine their own practices and modify their practices over time, thereby advancing workplace practices (Elliot, 1987; Ghaye & Lillyman, 2000;White, 2003).

Reflection is an effective way of integrating theory with practice and forms one of the keys to achieving improved healthcare delivery (Boud et al., 1985; Ghaye & Lillyman, 2000; Schön, 1987; Wong et al., 1995; Young, 2002). It is an effective learning strategy, assisting practitioners to surface the tacit knowledge and understanding that informs workplace practices. Reflection, therefore, enhances professional judgment skills, and assists practitioners in their personal development and in professional accountability (Boud et al., 1985; Ghaye & Lillyman, 2000; Khanna, 2002; Mezirow, 1990b; Schön, 1983, 1987).

Reflection allows practitioners to examine their own decision making process and to identify knowledge gaps, and hence determine their own learning needs (Bolton, 2001; Henwood, 1999; The Society of Radiographers, 1998). Reflection is also an effective means of helping practitioners to face and examine problematic scenarios (Bolton, 2001). Incorporating reflection into CPD is an effective way of assisting practitioners to maintain their current and future competence and is accepted as an exemplary model of professional development (Fenwick, 2003; Mott, 2000;White, 2003).

Purpose of reflection in Continuing Professional Development in Medical Radiation Science

Given the challenges confronting the MRS profession, reflection is of particular importance for both MRS practitioners and the MRS profession. Reflection empowers MRS practitioners and revitalises waning professional passion (Ghaye & Lillyman, 2000). As already discussed, one of the main reasons why MRS practitioners attach such low value to their clinical responsibilities is because radiographers "do not conceptualise radiography as a profession", regarding radiography "as task-oriented work that is intellectually undemanding" (Baird, 1998, p. i). Providing opportunities for practitioners to reflect on their roles and contributions in the workplace and their relationship with other healthcare professionals, it is likely to increase professional confidence and self-esteem, which in turn motivates practitioners to continue learning (Bolton, 2001; Colyer, 1997; Gold et al., 2002).

However, most of the CPD activities offered in MRS cover areas of clinical knowledge and expertise, and not the values that practitioners place on their professional roles. Thus, by incorporating reflection as the focus of the CPD program, the present study aims to address the current deficiency in CPD programs. The importance of providing CPD activities for practitioners to reflect on their professional roles is highlighted by the reasons a member of the Australian Institute of Radiography gave when she tendered her resignation in response to the implementation of mandatory CPD:

> I have not and do not intend to participate in CPD … I am still using the same technique to x-ray knees and chests as I did 40 years ago. What earthly use would CPD be to that?"
>
> (Russell, 2004, p. 15)

The above comment suggests that this practitioner has a view that has not evolved since the day she first practised and her values have not kept pace with changing times; she seems to be cocooned in her own world, impervious to the rapid changes that are overtaking her. In order

to be called a professional and to be accountable for what professionals do, self-proclamation of having done a good job is inadequate. The above comment also illustrates the need for perspective transformation amongst MRS practitioners. Perspective transformation is only possible if members are given the opportunity to construct and de-construct the social context in which they work. There is a need for MRS practitioners to engage in continuous renewal and regeneration of professional practice, values and ethics and reflect on their professional roles, values and identities they wish to assume within the increasingly competitive and demanding healthcare sector (Ghaye & Lillyman, 2000; Killion & Todnem, 1991; Millerson, 1973). To address this deficiency, CPD activities that incorporate reflection will assist practitioners to keep pace with the rapidly changing societal, economical and political aspects of the healthcare system (Ghaye & Lillyman, 2000). Reflection is a suitable learning strategy that will satisfy the academic rigour of higher institutions and is of practical relevance to the clinical world (FitzGerald & Chapman, 2000).

Reflection can also assist MRS practitioners in their current roles. In a workplace that is protocol driven, reflection can assist practitioners to break away from the protocol driven workplace culture (Clouder, 2002). Reflection empowers practitioners by highlighting best practice and enhances clinical performance, thereby increasing professional esteem (Ghaye & Lillyman, 2000). This is because knowledge that is truly empowering and satisfying to practitioners is locally generated knowledge that is attained via reflective dialogues conducted with peers (Ghaye & Lillyman, 2000). This is the same practical knowledge, which Schön espoused as being of more value than the theoretical knowledge in professional practice; knowledge that surfaced upon reflection and in the process advances workplace practices and empowers practitioners (Schön, 1983, 1987).

Perspective transformation

Reflection can also assist MRS practitioners in preparing for the future. By transforming individual and collective perspective transformation, reflection assists practitioners in looking towards where they are heading in the future (Ghaye & Lillyman, 2000; Killion & Todnem, 1991). Through the process of exploring and reflecting upon their roles and the societal context in which they function, MRS practitioners will gain a better appreciation of their current and future roles within the healthcare sector (Ghaye & Lillyman, 2000;White, 2003). Thus, providing opportunities for members to reflect is an important direction that the CPD program should adopt to prepare its members for current and future challenges.

However, many MRS practitioners are sceptical of reflection (White, 2003) and "do not give credence to reflection on experience as a means of learning" (Colyer, 1997, p. 11). Some healthcare practitioners subscribe to the belief that the only knowledge that is of value and that is worth pursuing is scientific knowledge that will assist them in performing daily practices (Ghaye & Lillyman, 2000). MRS practitioners are no exception. Most MRS practitioners see themselves as users of knowledge rather than as creators of knowledge, adhering to a culture of protocol-driven practice (Sim, 2000). Reflection is often perceived as being too difficult and is frequently associated with negative outcomes or negative learning experiences (White, 2003). Critics of reflection point towards the fact that attempts by teachers to provide guidelines for reflection often turn reflection into a ritualistic exercise (Boud & Walker, 1998). Yet, learning can become disjointed when reflection is not framed in an appropriate learning context. Thus there is a need to adopt a balanced approach in facilitating reflection (Boud & Walker, 1998). It is therefore essential to incorporate reflection in the CPD educational framework, in providing a learning environment that allows daily workplace practices to be explored and reflected by practitioners in their local context (Bolton, 2001). Ignoring the potential benefits of reflection would be detrimental to MRS practitioners' ability to evolve and provide good quality healthcare.

Bolton's comment on the importance of reflection is particularly relevant for MRS practitioners, as illustrated by the following:

> Reflective practice is, however, more than an examination of personal experience; it is located in the political and social structures which are increasingly hemming professionals in. Their right to make moral and professional judgements is being eroded daily; they are being reduced to technicians, their skills to mere technical competencies. In order to retain political and social awareness and activity, professional development work needs to be rooted in the public and the political as well as the private and personal. To this end, a reflective practice examination of personal practice needs to be undertaken alongside open discussions with peers on the issues raised…
>
> (Bolton, 2001, p. 3)

As Valkenburg and Holden (2004, p. 354) pointed out, "some of the apathy within the profession can be attributed to educational programs ignoring the affective domain and allowing professionalism, pride in the profession, compassion and empathy to be 'caught and not taught'". Incorporating reflection as part of CPD can increase practitioners' awareness and appreciation of the political, social and ethical dimensions of the MRS profession (Bolton,

2001; Clouder, 2002; Ghaye & Lillyman, 2000; Valkenburg & Holden, 2004). However, if MRS practitioners see their professional knowledge only "in terms of facts, rules and procedures applied non-problematically to instrumental problems", then practitioners will continue to view CPD simply "as a form of technical training" (Schön, 1987, p. 39). Practitioners will not see the need for constant renewal of ethical, professional and social values and perspectives as part of holistic practice and professional responsibility (Clouder, 2002; Tate, 2002).

Baird (1998) argued that in order for MRS practitioners to gain professional recognition, both university and professional organizations must work together to encourage practitioners to reflect. She highlighted the need for practitioners to move away from the technical-rational mentality and engage in reflective, evidenced-based practice, that is oriented towards patient focus (Baird, 1998). While Baird was referring to undergraduate MRS programs, the same is true of CPD programs. Providing opportunities and assisting practitioners to reflect is an important part of CPD. This is not because practitioners as adult learners are incapable of reflecting, but rather because most have not been exposed to such a culture (Mezirow, 1990b). As one of the MRS stakeholders, universities have a role in shaping the future of healthcare professions by assisting to prepare graduates and practitioners for the uncertain future (Landesman, 1999). It is therefore the responsibility of universities to demonstrate leadership by providing opportunities for MRS practitioners to engage in reflection.

Ultimately, a CPD program that focuses on reflection aims to have reflective MRS practitioners. Reflective practitioners have an appreciation of their contribution to the profession and can claim ownership of the generation of local workplace knowledge (Ghaye & Lillyman, 2000). They assume responsibility for their own learning and are driven by the motivation to learn (Baird & Winter, 2005; Bolton, 2001; Dewey, 1933). Ownership of learning is an important consideration given MRS practitioners' lack of motivation to learn. While a protocol driven workplace culture encourages MRS practitioners to conform, resulting in clinical practice that is largely habitual and routine, reflective practitioners are open to new ideas and constantly seek to advance workplace practices (Baird & Winter, 2005). Reflective practitioners work collaboratively with their peers and adopt a holistic approach towards problem solving (Baird & Winter, 2005). They engage in critical reflection of their practice and examine their values, resulting in transformative learning that not only transforms perspectives of themselves as healthcare practitioners but also results in new

insights into their practice (Baird & Winter, 2005; Brookfield, 2000; Mezirow, 1990c). Reflective practitioners therefore represent the solution to the major challenges that are currently confronting the MRS profession: namely apathy, low professional self-esteem and lack of motivation to learn.

Incorporating reflection in Continuing Professional Development: Reflecting within a community of practice

Reflecting within a community of practice is one way in which reflection can be successfully incorporated into a CPD program. A community of practice involves groups of people coming together because of their shared expertise and interests (Wenger, McDermott, & Synder, 2002). Learning from reflection usually starts with personal reflection. Although personal reflection is important, limiting one's reflection to an individual level runs the risk of restricting the learning and insight within an individual's perspectives. In contrast, group reflection gives learning a social and political dimension (Bolton, 2001; Ghaye & Ghaye, 1998; Jarvis, 1987). Reflecting collaboratively with members of the same profession, or within a community of practice, has the added advantage of exposing one's ideas to peer critique (Mezirow, 1990a). Group reflection liberates participants from the constraint of personal bias by sharing and exposing their ideas to "rational and reflective discourse' (Mezirow, 1990a, p. 10). By making reflections explicit and out in the open, workplace practices are subjected to peers' critique, resulting in practice improvement (Ghaye & Lillyman, 2000). They are "free to challenge assumptions and premises, thereby breaking through the one-dimensionality of uncritically assimilated learning" (Mezirow, 1990b, p.361).

Communities of practice enhance participants' reflection (Smith, 2002). People who succeed are those who learned from and with each other (Goleman, 1998). Individual and collective reflections on work practices can provide the necessary encouragement and new perspectives to work practices, allowing practitioners to understand their own assumptions and validation of presuppositions of their work practices (Bolton, 2001; Mezirow, 1990b). When undertaken in a supportive environment, reflection can provide practitioners "with the courage and intellectual capacity to turn insight into improved action" (Ghaye & Lillyman, 2000, p. 96). Reflecting within a community of MRS practitioners, as a method of learning, is therefore particularly useful for MRS practitioners whose work is very much protocol-driven. Reflection undertaken within communities of practice is being promoted as one of the keys to unlocking professionals' understanding of their practices and advancing the profession

(Serafini, 2002; Wesley & Buysse, 2001). Thus, reflecting within a community of practice is a successful CPD strategy and is now an established form of contextualised professional learning in universities (Bolton, 2001; Ghaye & Lillyman, 2000; Jones & Steeples, 2002).

However, for CPD programs to be effective, it is essential to design appropriate CPD activities to meet the specified objectives (Castle et al., 1997). In designing an educational framework for an online CPD program, one must take into account relevant learning and teaching theories, the role of technology in online learning and the appropriate instructional framework that underpins the CPD program. Successful online learning is only possible with the seamless integration of appropriate learning and teaching theories, educational technologies and instructional framework (Twigg, 2000). This is because the learning and teaching theories inform the design of the learning environment while the educational technology makes possible the instructional and learning strategies adopted to realise the aims of the programs (Dabbagh & Bannan-Ritland, 2005). The design of the educational framework underpinning the CPD programs begins with an overview of the reasons for the proliferation of online learning in universities and the rationale for developing an online CPD program in the present study.

2.4.2 Online learning and Continuing Professional Development

Online learning has been defined as an "open and distributed [across time and place] learning environment" that is connected either by Internet and/or Web-based technologies to enable teaching and learning to take place (Dabbagh & Bannan-Ritland, 2005, p. 331).

The knowledge-based economy in an increasingly competitive globalised market has brought into focus the need for lifelong learning (Jarvis, 1999; Kearns, McDonald, Candy, Knights, & Papadopoulos, 1999). This demand for access to education, with increasing numbers of adults returning to universities or private education providers for further education, coincides with rapid development in information and communication technology (Littlejohn, 2003). Internationally, universities are tapping into technology as part of their course delivery strategy with online learning showing the same exponential growth as the Internet (Vergnani, 2005). Universities in the United States, the United Kingdom and Australia have embraced online learning as part of their learning and teaching strategies (Howard & Discenza, 2000; Ryan et al., 2000; Vergnani, 2005). Reasons for the push towards online learning include the

trend towards mass education, technology innovation, ease of access to the Internet, universities' shrinking financial budgets and growing emphasis on the provision of a flexible, innovative and learner-centred teaching (Ash & Bacsich, 2002; Fox, 2001; Johnson, 1999; Kearsley, 2000a; Nguyen & Kira, 2000; Ryan et al., 2000; Tschang & Della Senta, 2001). The ability to network computers offers learning flexibility in terms of time, place and availability of resources through the World Wide Web (Hawkes & Romiszowski, 2001; Jochems, van Merrienboer, & Koper, 2004b; Littlejohn, 2003). Information and communication technology provides learning outcomes that were hitherto not possible with traditional distance education. For instance, learners who are geographically dispersed can now form virtual learning communities and engage in collaborative learning online (Hough et al., 2004; Kearsley, 2000b; Ryan et al., 2000; Weller, 2002). This approach has several advantages such as collaborative and authentic learning, learner-centred approaches and the creation of virtual communities of learning (Kearsley, 2000a; Weller, 2002). However, such positive outcomes can only occur with careful and meticulous design and planning.

When designed appropriately, online learning can form part of an authentic learning experience by providing learners with opportunities to acquire the learning competencies necessary for lifelong learning in this digital information age. With the growth of the Internet, increasing reliance on electronic databases and the proliferation of online courses, the ability to function, communicate and manage knowledge in an online environment is essential (Northcote & Kendle, 2001; Ryan et al., 2000; Weigel, 2002).

Despite the many advantages online learning has to offer, there have been major criticisms of this approach. These include the impersonal nature of online learning, the lack of interaction between peers and teachers, resulting in frustration, isolation and the subsequent lack of motivation for learning (Fungaroli, 2000; Kearsley, 2000a). The disadvantages account for high attrition and dropout rates for online learning (Kearsley, 2000a).

Successful online learning requires that learners be more self-directed in their learning, compared to the traditional face-to-face teaching that generally provides more support and guidance. Online learning also requires learners to have interpersonal skills for communicating with their peers and teachers online, and some level of self-regulatory and metacognitive skills such as planning, monitoring and self-evaluation of one's own learning progress (Jochems, van Merrienboer, & Koper, 2004a). This means that teachers must take

into account the abilities of the learners when designing online programs and provide the necessary support if such competencies are lacking. It is essential to address the above requirements and drawbacks in order to ensure the highest possible rate of successful completion.

What is the rationale for providing CPD programs online? Stakeholders are demanding that CPD education close the gap between formal education and professional practice (Jochems et al., 2004b). This has highlighted the need for CPD to address this gap and to enhance the learning and clinical competence of practitioners. With current educational technology, it is possible to support authentic learning online and assist practitioners in the development of professional competencies (Jochems et al., 2004b). Online learning has enabled universities to reach a wider audience than is traditionally possible, providing opportunities for remote learners and for those who opt for the flexibility of learning at their own pace (Naidu, 2003; Schrum, 2000; Weller, 2002). From the working adults' perspective, online learning offers the flexibility of allowing them to continue working fulltime while pursuing their study (Ryan et al., 2000).

MRS practitioners cited several reasons for not participating in postgraduate education. These included work constraints such as their involvement in shift work, lack of employer support, poor staffing levels and other factors such as cost, lack of incentives and difficulties in accessing resources for rural and regional practitioners (Doug McGhie and Associates, 2000; Henwood et al., 2004; Jackowski & Akroyd, 2001). With the continuing emphasis on lifelong learning and CPD for professionals, online learning can meet the changing consumers' demands and provide the flexibility demanded by adult learners (Ryan et al., 2000; Schrum, 2000).

There are therefore three main reasons for opting for an online CPD program in the present study. First, the commercial imperatives driving the online learning agenda in higher education render delivering CPD programs online an attractive financial option. Second, online learning offers the flexibility of learning required by adult learners, which is especially pertinent for MRS practitioners who are often involved in shift work. Third, with current technology, delivering CPD programs online is now a viable alternative in providing practitioners with meaningful, learner-centred and authentic learning experiences. The focus of the present study is, therefore, to design an educational framework for a CPD program to assist MRS practitioners to meet the current and future needs of the MRS profession.

Successful online learning is only possible if it is based on relevant learning and teaching theories and adopts the appropriate technology and instructional framework to enhance learning (Jochems et al., 2004a). The next section examines the learning and teaching theories that are relevant to the present study.

2.4.3 Review of current learning and teaching theories

Online pedagogy has been influenced by a range of learning and teaching theories, these include constructivism, situated learning and learner-centred learning (Deden & Herrington, 2002; Dougiamas & Taylor, 2002; Kearsley, 2000b; Mayes, 2001; Reeves, Herrington, & Oliver, 2002; Weller, 2002). These are discussed below.

Constructivism

Constructivism arose from cognitive psychology with Piaget, Vygotsky Dewey and Bruner as major contributors in this field (Epstein, 2002; Fosnot & Perry, 2005). Constructivism focuses on how one learns (Biggs, 1999b; Brophy, 2002a; Fosnot & Perry, 2005; Weller, 2002). The constructivist approach to learning involves "*constructing*, *creating*, *inventing* and *developing* our own knowledge" (Marlowe & Page, 2005, p. 7). Instead of mere regurgitation of facts, learning according to the constructivist view requires learners to question, analyse, negotiate and construct their own knowledge. Constructivist learning also requires learners to integrate past experiences with current experiences in order to make sense of their own learning (Marlowe & Page, 2005). In the process, deeper learning results and new knowledge is built on prior knowledge, needs and beliefs (Brophy, 2002a; Collison, Elbaum, Haavind, & Tinker, 2000; Jonassen, 2001; Mayes, 2001; Morphew, 2000). Thus, constructivism involves individuals actively constructing knowledge rather than passively receiving information (Marlowe & Page, 2005; Phillips, 2000). And, because each individual has different experiences, it follows that the process of knowledge construction will vary between individuals (Marlowe & Page, 2005).

While there are several types of constructivism, two major forms of constructivism have emerged in the last decade: cognitive constructivism and social constructivism (Cobb, 2005). Cognitive constructivism focuses on individual cognitive process, approaching learning from the perspective of an individual. Social constructivism recognises and acknowledges the importance of social and cultural impact on learning (Cobb, 2005; Epstein, 2002). Knowledge

is only meaningful when embedded within the context of one's experience and social structure. Learning is therefore a social activity within a community of learning, and learning cannot be decontextualised from the social and cultural context of the learner (Jonassen, 2001; Lave & Wenger, 1991).

Social constructivism is thus a variation of cognitive constructivism and focuses on the social and collaborative nature of learning (Epstein, 2002; Graduate Division, 2005). There is a shift from individual learning to learning as a social activity (Mayes, 2001). Social constructivism involves two or more learners pursuing shared goals, learning collaborating with one another, negotiating and co-constructing their own knowledge and understanding (Brophy, 2002a; Graduate Division, 2005). Collaborative learning has many advantages. It promotes reflection, since learners are required to explain ideas thereby assisting them to reflect and to improve on their own understanding. There is better learning as learners are exposed to multiple perspectives, with the resultant learning broader and greater than the individual sums (Cheetham & Chivers, 2001a; Weller, 2002). In social constructivism, the emphasis is now on teachers facilitating the learning process and with learners assuming increasing responsibility for their own learning (Lammintakanen & Rissanen, 2003; Weller, 2002). Although cognitive and social constructivism differ in their emphasis on what impacts on learning, the commonality lies in that learners themselves must assume an active role in constructing knowledge (Biggs, 2003).

For the past 10 years, the emerging pedagogical basis for online learning is social constructivism (Tobin, 1993; Weller, 2002). One reason for its popularity, especially in professional education, is the compatibility of constructivism with the many advantages that online learning has to offer (Tobin, 1993). While didactic teaching does not work well in an online learning environment, collaborative construction of knowledge is possible with computer-mediated communication (Weller, 2002).

However, social constructivism is not without its drawbacks. It is more time consuming than traditional didactic teaching as learners need to engage in discussions and grapple with underlying concepts (Weller, 2002). The effectiveness of social constructivism as a learning strategy is also dependant on learners' ability to learn independently and their ability to communicate and work collaboratively (Brophy, 2002b). It is erroneous for teachers to assume that learners are able to learn independently and collaborative; much depends on their

age and maturity. To this end, it is essential to design a learning environment that is supportive of learners in adopting a social constructivist approach to learning and with learning outcomes that are achievable within a realistic timeframe.

In CPD programs, each learner will have different levels of knowledge and expertise with different clinical experiences. Compared to the passive assimilation of knowledge, allowing learners to assume an active role by questioning, negotiating and constructing their own knowledge, collaboratively within their professional community, is a more appropriate learning approach. Thus, social constructivism is part of the educational framework used in the present study.

Learner-centred learning

While Hayward (1905) and Dewey (1956) were responsible for the conceptualisation of learner-centred learning, it was Carl Rogers who introduced the concept into education (Burnard, 1999 as cited in O'Neill & McMahon, 2005). Gibbs (1995) describes learner-centred learning as learners making decisions as "*what* is to be learnt, *how* and *when* it is to be learnt, with what outcome, what criteria and standards are to be used, how the judgements are made and by whom these judgements are made" [italics added] (Gibbs, 1995, p. 1). Learners are expected to set their own learning goals, determine the types of learning activities and manage their own learning. As opposed to teacher-centred learning, where the focus is on teachers transmitting the knowledge with learners being the passive listeners, learner-centred learning involves learners being the active participants (Gibbs, 1995; Lea, Stephenson, & Troy, 2003). In learner-centred learning, the emphasis is on the type of learning activities that will bring about increased understanding rather than knowledge acquisition. Through appropriate learning activities, learners are required to constantly shape their own understanding through discussions with their peers and teachers. Thus, inclusive in learner-centred learning is the social dimension of learning (Di Napoli, 2004). The emphasis is on the process of learning and learners' competence, as opposed to mere knowledge acquisition in teacher-centred learning (Gibbs, 1995). Hence, teachers assume an important role here as the facilitators of learning rather than the traditional role of transmitter of knowledge (Di Napoli, 2004). This shift in focus on responsibility and power from teacher to learners is consistent with the current focus on lifelong learning, which places greater emphasis on learners assuming more responsibility for their own learning (Sparrow, Sparrow, & Swan, 2000).

Examples of learner-centred learning includes case-based learning, project based learning and problem-based learning (Pedersen, 2003).

Adults are intrinsically motivated to learn, they are self-directed in their learning and due to their level of maturity, are more inclined towards problem-solving (Knowles, 1984). Due to their accumulated life experiences, they often bring with them pre-conceived ideas about learning, which may in turn affect their attitudes towards learning. In addition, as a result of competing demands of work, social and family commitments, adults are often goal-oriented in their learning (Birkenholz, 1999; Corder, 2002). When designing CPD programs, it is therefore essential to take into consideration the characteristics of adult learning and to consider the how and why of teaching instead of solely concentrating on what to teach (Di Napoli, 2004). Adopting a learner-centred approach to learning for adults, with learners assuming autonomy and an active role in learning, is the preferred approach rather than the passive mode of learning (Knowles, 1984). Thus, learner-centred learning is another of the learning and teaching theories that is adopted in this current study.

Situated Learning

Much of the formal learning that occurs in institutions is decontextualised; operating on the basis that "learning is an individual process" separated from the rest of daily activities (Wenger, 1998, p. 3). However, quality teaching is not about dissemination of decontextualised knowledge (Laurillard, 2002). This is because learning is very much a natural part of daily activities, is context dependant and takes place within a social and cultural background. Situated learning focuses on the social and cultural aspects of learning, making contextualised learning a meaningful experience (Kearsley, 2000b; Lave & Wenger, 1991). Quality learning is about making situated learning possible (Laurillard, 2002).

According to Lave and Wenger (1991), learning is not about knowledge acquisition but more about social participation. Learning is only meaningful when embedded within one's culture The learner's identity within the community evolves as a result of one's learning (Wenger, 1998). Lave and Wenger call this legitimate peripheral participation. As new comers to a professional community, individuals learn best through first participating in non-essential activities, interacting with practitioners and experts within a community of practice, and then gradually moving on to participate in core activities. This represents the progression of a novice to an expert within a community of practice (Lave & Wenger, 1991; Wenger, 1998;

Wenger et al., 2002). Many researchers have used the progress of novice to expert as a framework in understanding the development of professional expertise (Walker, 2001).

Situated learning is also learning that "occurs in the context of activities that typically involve a problem, others and a culture" (Milrad, Spector, & Davidsen, 2003, p. 15). An example of situated learning is authentic learning. Authentic learning involves problem solving, with learners experiencing the ambiguity and complexity of the real world and appreciating how problem-solving skills relate to actual professional practice (McKenzie, Morgan, Cochrane, Watson, & Roberts, 2002; Reeves et al., 2002; Reynolds, Treahy, Chao, & Barab, 2001; Stein, 1998; Young, 1993). Situated learning therefore also involves engaging "learners in tasks that reflect practices encountered in professional work place settings" (Herrington & Bunker, 2002, p. 307). In situated learning, knowledge and skills are best learned by reflecting on how they are applied in everyday situations (Stein, 1998). As a theory of learning, situated learning is particularly suitable for CPD programs.

Community of practice

The importance of situated learning is its emphasis on learning as "co-participation within a community", as opposed to learning as an individual cognitive endeavour (Goodyear, 2002; Weller, 2002, p. 76). A community of practice consists of people who share common experienced activities. In a community of practice, individuals collaboratively construct knowledge to form a common understanding and set of beliefs for their shared practices and members of the community have access to this shared knowledge (Lave & Wenger, 1991). As individuals learn, their identities within the community of practice evolve as they become gradually transformed by their participation in the community of practice. The community of practice, in turn, develops as the community as its practices transform (Walker, 2001). Thus, learning does not necessarily have to occur in formal settings but can also occur informally through a community of practice (Lave & Wenger, 1991).

Traditionally, the emphasis on learning is on the transmission and assimilation of knowledge. Learners' knowledge is noted only when it serves to demonstrate their understanding (Jonassen, Peck, & Wilson, 1999). Learners are not expected to participate in the process of knowledge construction and their contributions are not sought after nor valued. Much of such learning is passive and learners lose their identity within the masses (Jonassen et al., 1999). In contrast, in a learning community, there is a conscious effort directed at creating a supportive

and collaborative learning environment with learners participating actively in the learning process. Each learner forms an essential part of the learning community, each contribution is valued and forms part of the collective resources (Fox, 2002). Learning outcomes, on individual and collective level, increase as participants share and exchange, evaluate and synthesis information with one another. These activities serve to emphasise the value, worth and identity of each learner. By being an integral part of this knowledge building process, learners claim ownership of that learning which in turn further *motivates* them to participate in the learning process and *engages* them in the learning community (Jonassen et al., 1999).

It is in this context that the concept of community of practice assumes increasing importance in online learning (Crook, 1995; Weller, 2002). This is because online learning is able to bring practitioners from different regions together to form a virtual community of practice. A learning community is formed when learners perform authentic tasks and work towards a shared goal in a supportive learning environment (Jonassen et al., 1999). In fact, Wenger proposed that the purpose of educational design should be directed towards the formation of a learning community and allowing learners to form their own identity (Wenger, 1998). Brown and Duguid also point towards the importance of the community of practice in engaging learners in their learning, as the following comment illustrates:

> Teaching and education, from this perspective, are not simply matters of putting students in touch with information…Rather they are matters of putting students in touch with particular communities
>
> (Brown & Duguid, 2000, p. 220)

In CPD, the emphasis of learning as a social process has several implications for practitioners, professional community and workplace. For the individual practitioner, learning becomes a process of "engaging and contributing to the practices of their communities" while for communities of practice [the MRS profession], one of the benefits is the modification and refinement of new practices (Wenger, 1998, p. 7). From the workplace perspective, through the social participation of learning, the workplace as an entity, and through its employees, the workplace becomes more aware of its knowledge, thereby making it possible to enhance workplace performance and development (Ghaye & Lillyman, 2000; Wenger, 1998). Participating and interacting in a community of practice is therefore an effective form of professional development, both for the MRS practitioners, the profession and the MRS

workplace (Lagache, 1993). As such, situated learning is another learning and teaching theory that forms the basis for the educational framework in the present study.

Summary of learning and teaching theories

Constructivism, learner-centred learning and situated learning are three major learning and teaching theories that form the educational framework for CPD in the present study, with reflection chosen as one of the main learning strategies for CPD learning.

Healthcare practitioners who participate in CPD programs are likely to have disparate backgrounds. Their knowledge of subject matter and competencies are likely to vary, with differing learning styles and varying degrees of past learning experiences (Corder, 2002). The social constructivist approach to learning, with its emphasis on learners questioning, reflecting and negotiating their own learning, is therefore an appropriate methodology for this educational framework for CPD. First, compared to younger learners, adult learners are more likely to have the ability to assume autonomy for their own learning and the maturity to engage in co-constructing their own learning. Second, as practising practitioners, they will have the necessary expertise and clinical experience to participate in reflective dialogues with their peers (Clouder, 2002; Powell-James, 2002; Young, 2002). Finally, constructivism, as a learning approach, is ideally suited to supporting the process of reflection (Titchen & Higgs, 2001), as seen in Schön's work where the reflective practitioner is also related to constructivism (Brockbank & McGill, 1998). Schön relates reflection-in-action to the practitioner's concept of reality by having the practitioner construct his/her own understanding of professional practice, as the following comment illustrates:

> Underlying this view of the practitioner's reflection-in-action is a constructionist view of the reality with which the practitioner deals – a view that leads us to see the practitioner as *constructing* [original italics included] situations in practice, not only in the exercise of professional artistry but also in all other modes of professional competence.
>
> (Schön, 1987, p. 36)

In health professions, creation and validation of clinical knowledge by practitioners is based on constructivism and reflection (Titchen & Higgs, 2001). In fact, the most important contribution of constructivism is its promotion of learner-centred learning (Hoover, 1996). Learner-centred learning overlaps with social constructivism and situated learning with its emphasis on learning as an independent, active and social learning process (O'Neill &

McMahon, 2005). Effective social constructivism requires a learning environment that is supportive of collaborative learning and personal autonomy. In order to make learning meaningful, learning must be situated against learners' daily experiences (Brown, Collins, & Duguid, 1989).

Successful situated learning approaches focus on encouraging learners to reflect on their daily experiences with the aim of applying their knowledge content as opposed to mere acquisition of content per se (Stein, 1998). To this end, providing opportunities for learners to contextualise their learning experiences against the values, culture and norms of their workplace and professional community is essential. Situated learning and the concept of communities of practice have given learning in higher education a new direction (Goodyear, 2002). Reflective dialogue is regarded as one of the most effective methods of group reflection (Bolton, 2001) and it is through the community that learners learn, reflect and construct meaning as they interact with their peers. Reflecting within a community of practice is one way of assisting practitioners to look beyond their immediate practices, transforming them from being merely technical practitioners to reflective practitioners (Zeichner & Liston, 1996). Reflecting within a community of practice has been successfully applied in the context of computer-mediated conferencing (Hough et al., 2004; Seale & Cann, 2000). The creation and fostering of an online community of practice serves as one of the key motivators and success for online learning (Brosnan & Burgess, 2003; Jonassen et al., 1999; Purcell-Robertson & Purcell, 2000; Salmon, 2002a).

Assessment and feedback

Much of online assessment focuses on retention of facts rather than on competencies such as problem solving and collaborative learning (Mason, 2001; Sluijsmans & Martens, 2004). However, along with the shift from teacher-centred learning to learner-centred learning, there is now gradually a corresponding change in assessment trend (McLoughlin, 2003). While traditional assessment is on assessing memorisation, the emerging trend is on the assessment of competencies and the understanding of application (Di Napoli, 2004; McLoughlin, 2003).

Assessment "measures what a person is learning and where a person is in relation to expected learning" (Marlowe & Page, 2005, p. 51). Thus, the broad aims of assessments are both formative and summative (Johnston, 2003). Summative assessment grades learners' learning and determines if they should be awarded credit while formative assessment provides learners

with feedback to enhance learning and to improve ongoing performance (Biggs, 2003; Moon, 2004; Tiffin & Rajasingham, 2003). However, assessment can only enhance learning if assessment tasks are designed according to the principles of effective assessment (Radloff & de la Harpe, 2003). These principles include the need for constructive alignment (aligning assessment with learning aims and activities); the explicit expression and communication of assessment criteria; using a range of appropriate assessment tasks; engaging students in assessment tasks that result in quality learning, and providing prompt, specific and constructive feedback (Biggs, 2003; Dunn, Morgan, O'Reilly, & Parry, 2004; Gibbs & Simpson, 2005; Radloff & de la Harpe, 2003).

Constructive alignment calls for the need to align course aims, learning activities and learning outcomes (Biggs, 1999a). Effective teaching is only possible "when there is alignment between what we want, how we teach and how we assess (Biggs, 2003, p. 27). In constructive alignment, there is no hidden curriculum. The aims clearly specify the criteria for the desired learning outcomes, learners engage in learning activities that will assist them in attaining the specified aims and undertake assessment tasks to inform how well they are learning.

Constructive alignment is important because learners are assessment driven (Biggs, 1999b; de la Harpe, Radloff, & Wyber, 1999; Gibbs, 1999). Thus, it is important to be explicit about the goals, outcomes and criteria for assessment. Being open about the rationale and nature of the activities in relation to the goals and outcomes is also an important motivator in computer mediated communication learning (Salmon, 2002a). In addition, as part of CPD, it is important to link learning objectives explicitly with the learning activities and desired outcomes, so that participating practitioners are fully aware of the expected outcomes of their CPD activities on their work performance (Henwood, 1999).

In line with the constructive alignment model, assessment in programs that adopt the social constructivist approach to learning should assess the constructivist and collaborative elements of learning (Salmon, 2003). In fact, Biggs described constructive alignment as "a marriage between a constructivist understanding of the nature of learning and an aligned design for teaching" (Biggs, 2003, p. 27). Thus, the aim of formative assessment in social constructivist learning is to assist learners to further negotiate and construct their understanding, both at an individual and collaborative level, and to ensure that they have achieved the higher order of

learning such as problem solving, reflection, synthesis and hypothesising (Biggs, 2003; Di Napoli, 2004).

A range of assessment tasks is therefore needed to assess different outcomes (Brown, Bull, & Pendlebury, 1997; Cobb & Solomon, 1999; McLoughlin, 2003). These include peer and self-assessments, and formative and summative assessments. Learners' contributions on discussion forums can serve as a formative form of assessment, enabling the teacher to assess collaboration and interpersonal skills (McLoughlin, 2003). If the learning objectives and activities are about reflection, then as part of the learning outcomes, it follows that the assessment tasks should be directed towards assessing participants' ability to reflect. Thus, assessment tasks such as reflective journals, peer and self assessment are appropriate forms of assessment tasks for reflection, as opposed to multiple-choice and short answer questions that generally reflect superficial forms of testing albeit an efficient method of mass assessment (Biggs, 2003; Light & Cox, 2001; McLoughlin, 2003).

Peer assessment is particularly suited for networked learning, where each learner is expected to assume an important role in contributing towards the community of learning. Peer assessment is further facilitated in online learning by the public display of learners' works such as record of discussions in the discussion forum (Biggs, 2003). As a formative assessment, peer assessment assists in the development of reflection, collaboration and metacognition skills (McLoughlin, 2003). Metacognition includes one's awareness of himself or herself as a learner and empowering the learner to learn how to learn (Weigel, 2002). Examples of metacogntive skills include planning, monitoring, evaluating and reflecting on learning (Goodyear, 2002; Radloff & de la Harpe, 2003). By requiring that learners reflect and provide constructive feedback to their peers, peer assessment supports the development of competent professionals (Sluijsmans & Martens, 2004).

One of the criteria for a professional is the ability to self-evaluate and to be an autonomous learner. To this end, peer and self-assessment play an important role in assisting learners to assess their own learning (Light & Cox, 2001). Learners reflecting on their learning is an effective form of self-assessment (Gagnon & Collay, 2001). The adoption of self-assessment is consistent with learner-centred learning where the focus is on learners' engagement. Self-assessment is also an appropriate assessment strategy for online learning where there is a greater element of self-directed learning (Buchanan, 2004). However, learners need to be

guided on the process of self-assessment, failing which they may not be accurate or honest in their evaluation (Buchanan, 2004).

Constructive feedback, that is timely and succinct encourages learners to reflect on their learning, can help learners to become more proficient in self-evaluation (Boud, 1995). However, care must be taken to avoid over reliance on feedback. There is, therefore, a need to adopt a balanced approach to providing adequate feedback so that learners do not become overly reliant on teachers' feedback (Johnston, 2003).

Choosing the appropriate assessment strategies forms an important part of learning. Inappropriate assessment can either result in alienation of learners, if they feel their contribution is being rejected, or may generate conformity of thoughts (Light & Cox, 2001). However, if teachers choose the appropriate assessment methods, assessment can also serve to modify learners' learning approaches and motivate them to learn (Johnston, 2003; Gibbs & Simpson, 2005). Assessment trends have moved from "a culture of testing and standardized tests to a culture of learning" (McLoughlin, 2003, p. 204). With the emphasis towards lifelong learning, the need to demonstrate learning and social competencies such as communication skills, problem solving, and teamwork skills are paramount. To this end, effective online assessments are those that are grounded in a constructive approach, with an emphasis on assessing learners' abilities to reflect, evaluate and construct new meaning (McLoughlin, 2003).

Inappropriate use of technology is one of the most common reasons why online learning fails to support learning (Rodrigues, 2002). Hence, the next section explores the role of technology in online learning. Specifically, it examines how technology can support the kind of learning environment espoused by the theories of social constructivism, learner-centred learning and situated learning, and how technology can actualise the learning strategy of reflection adopted in this present study.

2.4.4 Role of technology in online learning

In online learning, technology acts as the vehicle that actualises the instructional framework and learning strategies to achieve the desired learning outcomes. The key to successful online learning is to integrate technology with appropriate learning and teaching theories and

instructional framework, in order to provide learners with authentic and meaningful learning experiences (Dabbagh & Bannan-Ritland, 2005; Twigg, 2000). Learning is an active and social process. This section explores how educational technology can be used to create the kind of social, learner-centred and authentic learning experiences as established by the learning and teaching theories of social constructivism, learner-centred learning and situated learning discussed previously.

New technologies, by themselves, do not lead to changes in education (Mayes, 2001). For too long, information transmission has been perceived as the "defining feature of learning" (Weigel, 2002, p. 30) and technology has been used simply as a medium to convey information (Darby, 2002; elearningpost, 2001; Morphew, 2000). Using technology simply as a transmitter of knowledge constrains learners and does not result in improved learning (Jonassen, n.d.). Technology should be used as a tool to assist learners in exploring new understanding and to provide authentic learning experiences in a manner so as to enrich their learning (Reeves et al., 2002; Weigel, 2002). As such, the technology that can bring about the desired learning outcomes should be used (Edwards, 2002).

Current technology such as computer-mediated communication makes the communicative and collaborative nature of social constructivism and the concept of a community of practice possible in an online learning environment (Ryan et al., 2000; Weller, 2002). Computer-mediated communication refers to all forms of communication technology that are used in conjunction with computers, digital networks and software systems to promote communication online (Ryan et al., 2000; Weller, 2002). These include email, list servers, threaded discussion forums, audio and videoconferencing, providing learners with the option of asynchronous and synchronous text chat (Hawkes & Romiszowski, 2001; Weller, 2002). Threaded discussion forums (henceforth known as discussion forums in the thesis) refer to a public form of group email communication system that makes group discussions possible. Learners' messages are located in a public area, where they can read each other's responses, and the messages can be titled according to the topic discussed and recorded (Dabbagh & Bannan-Ritland, 2005).

Computer-mediated communication, such as the discussion forum described above, supports social constructivism, learner-centred learning, situated learning and reflection. Computer-mediated communication promotes collaborative learning and reflection, and is increasingly

used as a medium in facilitating reflective dialogue amongst learners (Salmon, 2002b; Seale & Cann, 2000; Weller, 2002). With text-based computer-medicated communication, learners are required to express themselves. Writing clarifies one's thoughts and enhances one's understanding. Together with reflective dialogues and collaborative learning, computer-mediated communication enables learners to assume an active role by reflecting, constructing and reshaping meaning as they learn, making deeper learning possible (Ryan et al., 2000; Seale & Cann, 2000). Another advantage of computer-mediated communication is that it allows learners' messages to be recorded and reviewed. This enables them to review earlier messages thereby facilitating reflection and supporting constructive learning online, a feature which is not possible in the conventional classroom, (Jonassen et al., 1999; Laurillard, 2002; S. Ryan et al., 2000; Salmon, 2002a). The time delay nature of asynchronous communication, such as email or threaded discussions, allows participants the time and space to reflect and compose their responses, as well as providing opportunity for wider contribution from all learners (Henri, 1995; Kearsley, 2000a; Ryan et al., 2000). Asynchronous communication is thus less socially demanding and provides opportunities for more thoughtful discussion than synchronous communication such as synchronous text chat (commonly known as live chat). The latter requires more spontaneous and immediate responses (Kearsley, 2000a). These two modes of communication complement each other, combining "the informality and spontaneity of oral communication with the permanence of written discourse" (Slatin, 1992, p. 34). Unlike face-to-face interactions, preconceived prejudices can be avoided as age, race, gender and physical appearance are not apparent in a text-based nature of computer-mediated communication (Ryan et al., 2000). Computer-mediated communication is therefore crucial in supporting a learning community online (Weller, 2002). However, learning via computer-mediated communication does have its drawbacks and strategies need to be put in place to minimise these shortcomings. Such strategies will be addressed in detail in Section 2.4.5 on the instructional framework.

The use of computer-mediated communication as a form of networking in online learning has caused some researchers to make the distinction between online learning and networked learning. While online learning focuses on the "individual interacting with materials" online, networked learning emphasise "group interacting with materials and with each other" (Foster, Boswskill, Lally, & McConnell, 2002, p. 131). With networked learning, there is therefore a shift from individual learning to a culture of collaborative and a community of learning, as the following comment illustrates:

> Networked learning is learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources.
>
> (Jones & Steeples, 2002, p. 2)

In the present study, online learning and networked learning are seen as synonymous.

Current status of online learning

Commenting on a 2000 study investigating the pedagogy status of online courses, Mioduser and his associates (2000) concluded that while some web-based courses were using a high level of sophisticated technology on their websites, most online courses simply relied on a traditional teaching strategy rather than adopting a learner-centred approach. The online courses promoted rote learning instead of constructivism, didactic teaching instead of inquiry-based learning and individual instead of collaborative learning. Interaction was very much an automated affair, with automated feedback and clicking on the mouse the norm (Mioduser, Nachmias, Lahav, & Oren, 2000). Generally, most online courses have failed to maximise technology to improve learner's learning, with most learning outcomes deemed to be equivalent to traditional courses (Twigg, 2003). More recently, Herrington & Herrington (2006) note that few academics seem to appreciate and understand the rationale of learner-centred and situated learning, with many courses still failing to adopt such learning approaches online.

Weller (2002) points out that learning and teaching theories and technology are the two main factors that influence online learning. Online courses can be designed using a combination of technology and learning and teaching theories (Weller, 2002). The online course can either be inclined towards a didactic approach, where the focus is on knowledge transmission by the teacher, with an emphasis on one correct answer to a constructivist approach of collaborative learning, where learners actively co-construct, negotiate their knowledge and assessment is based on their learning process and interpretation. The technology adopted can range from simple websites to the high end of technology where multiple media are used and there is a high degree of functionality and interactivity involved.

Depending on the aims of the online courses and resources available, online courses can fall into one of the four categories, ranging from high technology-constructivist approach to low technology-didactic approach (see Figure 2.1). Courses that involve a high degree of

technological sophistication require a team of technical staff in the creation, design and production of materials and may also require special software resulting in initial high cost associated with production of high technology online course (Weller, 2002). Courses that adopt a social constructivist approach may also incur a high operating cost in terms of the level of staff involvement required in facilitating learners' learning (Weller, 2002) (see Figure 2.1).

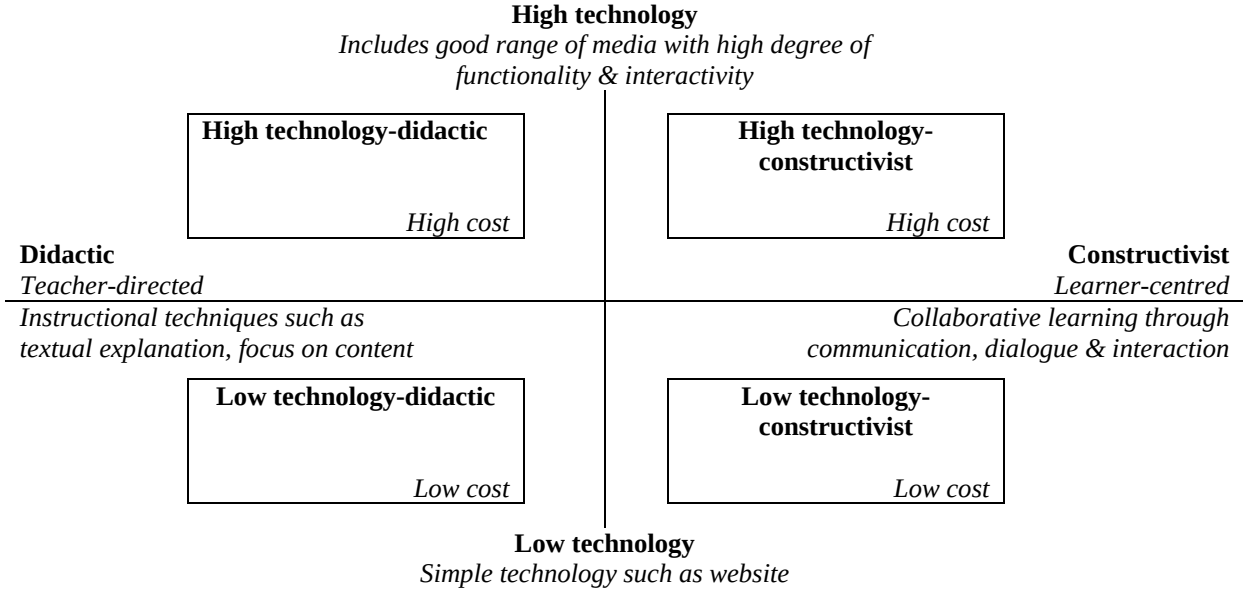

Figure 2.1
Weller's pedagogy-technology framework
Source: (Weller, 2002, p. 147, pp. 148-153)

Online learning is currently offered in one of the three following modes: fully online with no face-to-face interaction, "web-dependant" in which online participation is compulsory; and "web-supplement" where teaching is a combination of face-to-face and online components (Herrington & Bunker, 2002; Vergnani, 2005). Many universities are using online learning as a means of supplementing their face-to-face teaching (Vergnani, 2005; Weller, 2002). Specialised software designed for course management is now commonly used in Web-based courses (Dabbagh & Bannan-Ritland, 2005). Examples of the most widely used course management software are Blackboard, WebCT and FirstClass (Salmon, 2002b). The use of course management software has streamlined teaching activities, providing the necessary tools for teachers to perform administrative functions, teaching and learning activities and assessment on a single platform (Dabbagh & Bannan-Ritland, 2005; Fox, 2001; Kearsley, 2000a; Richards, Dooley, & Linder, 2004). It is possible to manage class lists, generate email

lists and learners' grades using management software. The software simplifies the technical aspects of Web-based courses by providing templates for content and learning resources via hyperlink, and for assessment activities such as quizzes, multiple choice and fill-in-the blank assessment. It also provides an avenue for collaborative discussions, both synchronous and asynchronous between learners and between learners and teachers, to take place via the discussion board (Dabbagh & Bannan-Ritland, 2005).

One reason for the increase in the use of course management software is its ability to assist teachers, who are novices in terms of online technology, to make the transition from face-to-face teaching to online learning (Dabbagh & Bannan-Ritland, 2005). Another advantage of course management software lies in its flexibility in enabling teachers to focus on their pedagogical preference, ranging from constructivist approach of learning to simply using the software as a means for didactic mode of content transmission (Dabbagh & Bannan-Ritland, 2005).

At the same time, the course management software, which is reliant on a template-based format, promotes course conformity of delivery. While it is this standardised presentation that accounts for learners' easy acceptance of online learning, Harvey & Lee (2002 cited in Dabbagh & Bannan-Ritland, 2005) argue that it is this standard approach that compromises instructional innovations and limits application of learning and theories, such as its inability to better support multimedia tools and authentic assessment. Despite these limitations, it is still possible for such course management software to support learner-centred and constructivist approaches, albeit within the constraint of the template-based format (Dabbagh & Bannan-Ritland, 2005). According to Weller's pedagogy-technology framework, depending on the pedagogical preference of the teacher, use of WebCT and Blackboard could either fall into the category of low technology-didactic or low technology-constructivist approach.

Examples of successful online courses

With the proliferation of online learning, there is increasing emphasis on the need to provide quality learning for learners who are participating in this mode of learning (Reeves et al., 2002). Based on the influence of social constructivism and situated learning, one common feature of online courses is the creation of an authentic learning environment where the focus is on designing authentic activities to simulate workplace problems (Reeves et al., 2002).

An example of constructive and authentic learning is provided in the *Graduate Certificate in Online Teaching and Learning*, at Edith Cowan University of Western Australia (Herrington & Oliver, 2006). The course was developed with the aim of assisting the professional development of teachers for online teaching. The learning environment was learner-centred and collaborative, with assessments that were integrated into learning activities that were authentic and contextualised (Herrington & Oliver, 2006). In the introductory subject of Online Teaching and Learning, students were required to explore issues on creation of effective learning environments. Students assumed a role in a fictitious university and were required to evaluate a website on an online course created by a group of universities. In collaboration with other students, the students recommend a set of principles and then redesign the original website in accordance with their recommended principles. The single complex task consists of a series of activities that must be completed over an extended period of time (Herrington & Oliver, 2006). Although the settings are fictitious, the tasks are authentic and represent the kind of scenarios and problems teacher practitioners will encounter in the workplace. As students reviewed the literature, they were required to apply their newly acquired knowledge in a meaningful way. This is, therefore, an example of authentic online learning, requiring students to learn and reflect at an individual and collaborative level. There is alignment of aims, learning activities and assessment where upon completion of the tasks, the end product forms the learning outcome and is assessable (Reeves et al., 2002).

However, online learning not only involves enhancing learners' learning. Current online technology has made virtual online learning communities a reality, making support networks an essential element for successful situated learning. A recent example of a successful online learning community is a 12-week module, *Postgraduate Essential*, created specifically to support students entering their PhD study (Farrell, 2005). The aim of the module is to 'bring together' rural and off-campus PhD students who often feel lonely and frustrated due to their isolation and lack of interaction with their peers. In addition to supporting students on their PhD journey, the module also aims to prepare students in the development of important academic skills. Thus topics such as *Starting your PhD*; *Getting organised – tools and strategies*; *Working with your Supervisor*; *Searching the literature*; *Writing a literature review*; and *Preparing for Confirmation* are included. As part of creating an informal learning environment, a game simulating the obstacles PhD students commonly encounter forms part of the learning activities. Students interact via discussion forums and chat rooms and a staff

member is available to facilitate the discussions (Fallows & Steven, 2000). Such open interactions provide opportunities for students to share their anxieties and concerns, providing reassurance and allaying their fears. This module emphasises the importance of building a community of learners based on common shared goals, with students supporting one another and easing their otherwise often difficult and tumultuous PhD journeys.

Having presented the learning and teaching theories that will inform the educational framework for CPD in this current study and how communicated-mediated communication can create the learning environment necessary for constructive, learner-centred and situated learning, the next section will examine the instructional frameworks to be adopted in this educational framework.

2.4.5 Instructional frameworks adopted in the educational framework

Constructive alignment and Salmon's 5-stage model of teaching and learning online are the two instructional frameworks that are adopted in the educational framework. This is because both instructional frameworks support the learning and teaching theories, which underpin the educational framework, and the learning strategy of reflection adopted in the present study.

Constructive alignment as an instructional framework

One of the prerequisites for an effective online program is the adoption of a constructive alignment model (Goodyear, 2002; Radloff & de la Harpe, 2003). In fact, failure to adopt a constructive alignment approach to design has been identified as one of the major reasons for poor online programs (Oliver, 2004). Constructive alignment not only serves to guide the teacher in how to assess learners' learning, it is also an effective instructional framework for online learning that adopts a social constructive approach to learning (Brophy, 2002a; Salmon, 2003). This is because the constructive alignment model promotes deep learning since the model advocates using assessments that are appropriately aligned to learning goals (Biggs, 2003; Johnston, 2003). Biggs describes constructive alignment as "a marriage between a constructivist understanding of the nature of learning, and an aligned design for teaching" (Biggs, 2003, p. 27). It is a combination of a constructive approach to learning and adopting an aligned method of instructions. Learners engaging in constructive alignment are active learners, constructing their own understanding in a supportive learning environment where there is consistency between learning aims, activities and assessment strategies (Biggs,

2003). Brophy (2002a) also highlighted the need for constructivist-based teaching to have clear learning goals and that the goals of authentic activities and assessments activities are aligned.

As already discussed (Section 2.4.1), reflection forms the focus of CPD programs for MRS practitioners in the present study. Reflection serves as an effective learning strategy for MRS practitioners in their CPD. According to constructive alignment, the goal is therefore to get practitioners to reflect and the desired learning outcomes are different types of reflection outcomes. To achieve the goal of reflection, participating practitioners engage in reflection as part of their learning activities and the assessment tasks should be directed towards assessing participants' ability to reflect.

Salmon's 5-stage model of teaching and learning online as an instructional framework

A feature of a good education design is to create and facilitate a supportive learning environment that enables learners to engage in meaningful learning in a structured manner (Buchanan, 2004). Salmon's 5-stage model of teaching and learning online guides learners progressively through their online learning. Stage 1 (access and motivation) focuses on getting learners to familiarise themselves with the computer-mediated communication environment, in preparation for their active participation in subsequent activities (Salmon, 2000, 2002a, 2003). Special emphasis should be directed at the affective aspects, specifically in assisting learners to acquire the "emotional and social capacity to learn with others online" (Salmon, 2002a, p. 12). This is because negative emotions about learning are detrimental to the ability of learners to engage in successful learning (Baskin, 2001; Boud et al., 1985; Radloff & de la Harpe, 1999).

Stage 2 of online socialisation is concerned with establishing the trust and repertoire between learners in order to lay the foundation for future collaborative work (Salmon, 2002a). As learners interact with one another, they are also establishing their own identities within the community of practice (Salmon, 2000, 2003). These objectives can only be achieved via appropriate learning activities. The moderator assumes an active role in the formation of a community of practice and paved the way for eventual successful fulfilment of learners' expectations (Salmon, 2002a). It is during these first two stages that learners start to develop a feel for the learning environment, gaining increasing confidence with their technical surroundings and finding a common ground with their online peers in the pursuit of learning.

Learners start to develop respect and bonding with one another, but only if they feel they are able to share their views in a safe, non-threatening and relaxed atmosphere (Salmon, 2002a).

In this model, the next three stages represent the most "productive and constructive for learning and teaching purposes" (Salmon, 2000, p. 36). Stage 3 involves information exchange between learners and between learners and moderator, basing on their pre-existing knowledge and via resources available on computer-mediated communication. In Stage 4, learners start to engage in more active learning, considering multiple perspectives through negotiation and deliberation with their online peers, often assuming the role of knowledge constructors rather than mere assimilators of knowledge (Salmon, 2000, 2002a). By the time learners reach the final stage, they are usually ready to engage in constructivist learning, becoming more critical and self-reflective. By now, learners have constructed their own understanding gained from the extended debate and discussions through the previous stages and are able to function independently within the computer-mediated communication environment (Salmon, 2000, 2002a).

Salmon's 5-stage model of teaching and learning online through computer-mediated communication provides an appropriate instructional framework for the proposed online module. First, the model, based on constructivism, situated learning and reflection (Salmon, 2002a), is consistent with the online learning and teaching which the researcher has chosen for the CPD in this study.

Second, Salmon's 5-stage model successfully engages learners in online learning (Salmon, 2002a). This is a 5-step developmental process, which brings learners through the initial stages of interacting with one another, with increasing frequency, to the final stages of knowledge construction and development (Salmon, 2000, 2003). The focus is on structuring meaningful activities that will involve learners in active participation and contributing to knowledge building within a learning community (Salmon, 2002a). Salmon's model therefore fits the researcher's aim of promoting learning through a community of practice via computer-mediated communication. The discussion forum serves as the learning platform that moves learners from one stage of learning to another. The exchanges and interactions provide a common understanding for further learning to take place. In the present study, providing opportunities for MRS practitioners to articulate their past reflection-in-action assists them in constructing their view of reality at their workplace and their professional practices (Schön,

1987). As discussed in Section 2.4.1, such collaborative learning and reflection provides the multiple perspectives that are necessary to uncover and highlight the value of MRS practitioners' work.

This approach of open reflective dialogue is also consistent with constructivism. By having reflective conversations amongst a group of like-minded practitioners, they are bringing into the open that unspoken, tacit and often illusive world of knowledge that forms the foundation of their knowledge (Salmon, 2002a; Wenger et al., 2002). In these exchanges, learners are encouraged to reflect openly, exchange dialogue and explore new meaning. Involving learners in such active engagement results in deeper learning, as learners are required to explain, apply and consider multiple perspectives in relation to their understanding (Biggs, 1999a). Moreover, being able to reflect on past reflection-in-action and reflection-on-action helps shape the practitioners' future work practices (Schön, 1987). Although many practitioners are already reflecting intuitively at the workplace, few are reflecting at the higher level, which calls for practitioners to re-examine their attitudes and beliefs (White, 2003). Reflecting via the MRS community of practice is one way of communicating these shared values and to identify with one another (Ghaye & Lillyman, 2000).

Third, Salmon's model addresses some of the common pitfalls of constructivist-based teaching approaches. These pitfalls include the lack of structure for learning, the assumption that learning will automatically occur once learners engage in some form of social discourse and the misconception of the diminished role of the teacher (Brophy, 2002a). Salmon's model focuses on supporting learners "through a structured developmental process" (Salmon, 2002a, p. 10). The model provides an activity framework that forms a "coherent learning system" that is necessary for constructivist learning thereby addressing the lack of structure for learning (Nuthall, 2002, p. 73). The model centres on both learners and teacher. Specifically, the model focuses on the provision of a safe, conducive, and structured learning environment for learners to develop their learning progressively, and for the teacher to assume the role of moderator in supporting and facilitating learners' learning (Salmon, 2000, 2002a).

The main role of a moderator is that of an educator facilitator, with the ability to adopt a flexible approach to learning and teaching online (Ryan et al., 2000; Salmon, 2004). Instead of leaving group discussions to assume their own course resulting in erratic or off-track discussions (Brophy, 2002a), the moderator is crucial in ensuring that the discussions remain

relevant. The moderator maintains an intellectual role, guiding and extending the discussions, facilitating learners' learning by providing timely feedback, suggesting learning resources and encouraging them to reflect on their work (Alexander & Boud, 2001; Kearsley, 2000a; Mayes, 2001). The moderator also steers the discussions by providing prompts and initiating questions, teasing out multiple perspectives, summarising learners' postings, highlighting key issues raised by learners, commenting on the adequacy and quality of discussions, and if need be, challenges their contributions in a supportive and encouraging manner (Kearsley, 2000a; Salmon, 2000, 2002a; Weller, 2002). Aside from empathy, which has been identified as one of the most important skills of a moderator, the moderator also needs to have online social skills to assist learners in building the trust and rapport with one another that is essential in a learning community (Salmon, 2004). The learning environment is one where learners feel safe and free to explore and engage their peers in discussions (Palloff & Pratt, 1999). There is no berating of opinions, every view and contribution is valued by all, and each learner can claim ownership of their learning. (Ryan et al., 2000; Salmon, 2000; Sanders, 2001; Weller, 2002). The moderator also assumes a managerial role. This requires the moderator to oversee the agenda and timetabling of the discussions, ensuring that all intended topics and issues are covered within the stipulated time frame. Addressing these pitfalls increases the overall participation rate and increased learners' satisfaction (Salmon, 2002a).

Fourth, although reflective dialogue within a community of practice can bring about multiple perspectives, it has been established that many courses failed to transform the thinking of learners. This is mainly due to the failure of the course concentrating on a central topic, resulting in a lack of focus amongst learners (Hough et al., 2004). By designing appropriate learning activities within Salmon's structured framework, it is possible to focus learning in a way that leads to learning outcomes that include transformation of learners' perspective.

Finally, many adult learners have to juggle family, social and workplace commitments, which imply that in some instances, they may be unable to commit fully to their learning (Birkenholz, 1999; Corder, 2002). As such, a carefully designed learning environment that provides clear instructions, structure and support to their learning activities, and yet provides sufficient flexibility for their autonomy, would go a long way to assisting busy adult learners in fulfilling their learning goals.

The next section presents the operationalisation of the online module. Based on the educational framework and using computer-mediated communication as the technology medium, it details how the instructional framework of constructive alignment and Salmon's 5-stage model of teaching and learning model, together with the appropriate learner support, can be successfully integrated into an effective CPD program for MRS practitioners.

2.4. 6 Educational framework underpinning Medical Radiation Science online CPD program

This section integrates the various elements discussed in Sections 2.4.2 to 2.4.5, namely learning and teaching theories, technology in online learning and instructional frameworks, and presents the operationalisation of the online module. It further details how support in the form of coaching, scaffolding and modelling was provided within the course management software. Figure 2.2 presents the educational framework, showing the main features of the framework in terms of learning and teaching theories, instructional frameworks and learning support adopted in the present study.

Learning and Teaching theories

The educational framework underpinning the MRS online CPD program is based on social constructivism, learner-centred learning and situated learning theories. These theories shaped a learning environment that is constructive, learner-centred, authentic and socio-culturally mediated. Participating practitioners assumed an active role in learning by reflecting, exploring, negotiating and reconstructing their understanding of clinical practice within a community of practice. In terms of technology, computer-mediated communication is the technology chosen to actualise social constructivist learning. The instructional frameworks of constructive alignment and Salmon's 5-stage model helped realise the aims of the CPD program.

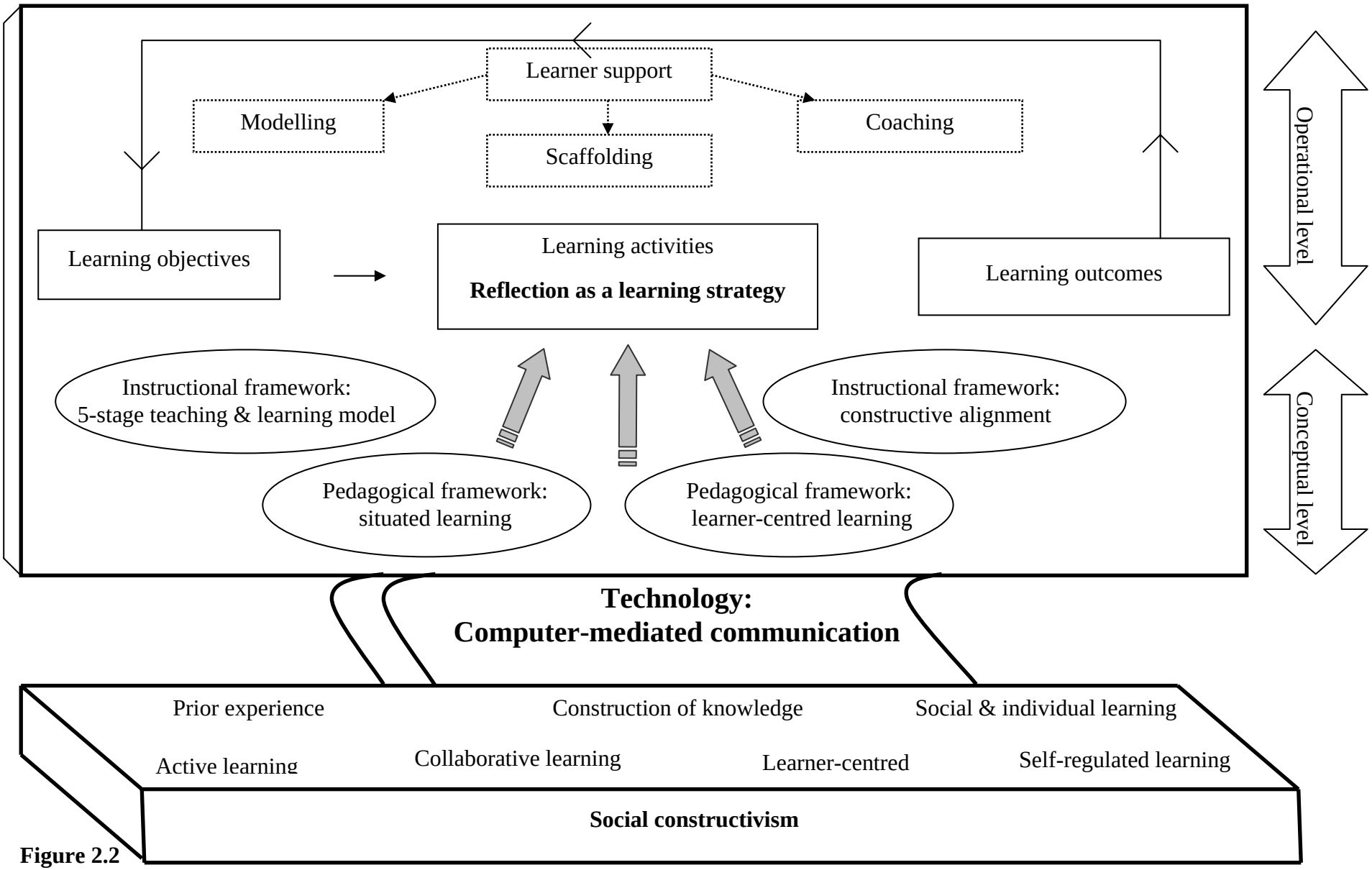

Figure 2.2

Educational framework underpinning the MRS online CPD program

Technology: adopting computer-mediated communication

In view of the financial constraints facing universities and in order to make the CPD program commercially viable, the design of the online module is based on existing course management software, thereby avoiding additional expenditure that is often associated with the set-up of high technology online courses. The appropriateness of technology in online learning can be evaluated by the extent to which technology promotes collaborative learning and teamwork (social constructivism), learner-centred learning, authentic learning and the extent in which it encourages the development of self-directed learning (Light & Cox, 2001).

Common course management software, such as WebCT and Blackboard's discussion board, has the basic communication features adequate for constructive and reflective learning in a community of practice. In computer-mediated communication learning, quality of learning is dependent on the skills of the moderator rather than on the number of features of available communication tools (Alexander & Boud, 2001; Salmon, 2003). Thus, it was concluded that course management software such as WebCT or Blackboard would meet the needs of this educational framework. Blackboard was the chosen software for the present study since Blackboard was the management software used at RMIT University. Moreover, it is likely that many participating practitioners in the study would not have participated in any form of online learning. As such, the technology needs to be as simple as possible to assist them in adapting to the learning environment quickly. In terms of Weller's pedagogy-technology framework, with the adoption of course management software, this online module therefore fits in the category of low technology-constructivist approach.

Instructional frameworks

While the constructive alignment model guides the alignment of learning objectives, activities and learning outcomes, Salmon's 5-stage model is used to assist in structuring the learning activities.

Learning objectives

As already explained (Section 2.4.1), reflection is the focus of CPD in the present study. Supporting MRS practitioners to reflect is therefore one of the main objectives of the online module. Enhancing professional knowledge forms another major learning objective of the online module; the specifics of this objective are dependent on the learning needs identified by MRS practitioners in the national CPD Survey (see Chapters 3 and 4).

In accordance with constructive alignment, and with reflection as the objective, it follows that participants must engage in reflection as part of their learning activities. To ensure authenticity of the learning activities, reflection must occur within context of the practitioners' workplace (Boud & Walker, 1998). By embedding reflection within the context of practitioners' professional knowledge and practice, the link between learning experience and reflection would be strengthened. This, in turn, would enhance the learning experience of the participants (Boud et al., 1985; Boud & Walker, 1998). As such, in planning the learning activities, special attention is directed at how reflection can be successfully integrated into the practitioners' clinical practice. This section explains how the researcher uses Salmons' 5-stage model to structure the learning activities.

Learning activities

Although Salmon's model provides a structured learning environment, it is sufficiently flexible to allow the teacher to design the course to meet its educational goals. In this online module, while adhering to the activities of Stage 1 and Stage 2 of Salmon's model, the researcher has contextualised the final three stages in the context of CPD for MRS (see Figure 2.3).

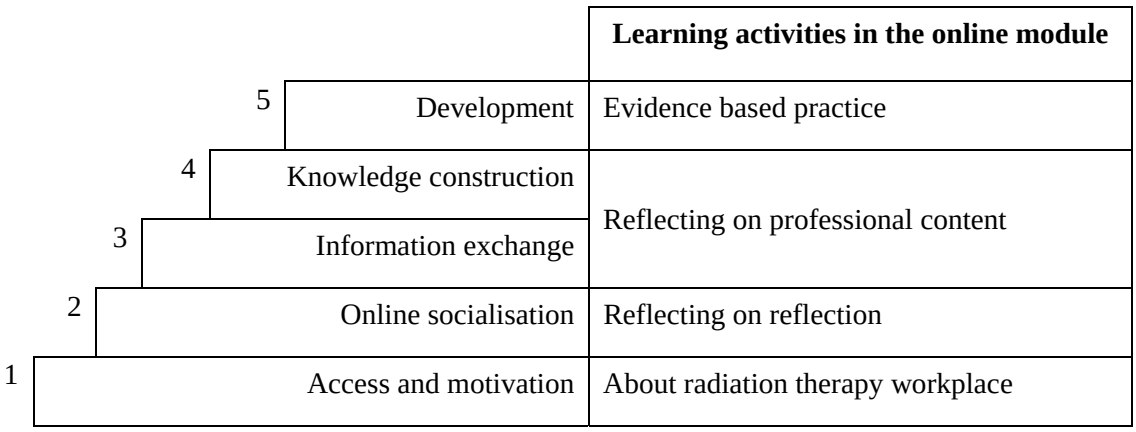

Figure 2.3
Summary of learning activities as applied in the online module using Salmon's 5-stage teaching and learning model
Source: Adapted from (Salmon, 2002a, p. 11)

Stage 1, Access and motivation, and Stage 2, Online socialisation

To ease adults into more complex tasks of learning and to encourage active participation, it is essential that the first few activities are 'easy' activities (Birkenholz, 1999). Thus, most of the learning activities in the first two stages are non-reflective activities. These non-reflective

activities enable participants to navigate their way around the online learning environment so as to participate in subsequent reflective discourse. Another important outcome is to establish trust and rapport between participants, which are vital in subsequent reflection activities (Jay, 2003; Salmon, 2002a).

To assist participants in establishing their identities within the community of practice, Stage 1 activities focuses on participants sharing with their peers about their workplace. Given the busy schedule of all adult learners, the researcher is mindful of the 'impatience' of the adult learners to launch immediately into the professional content of the course, often known as 'real stuff'. Thus, in Stage 2, as well as providing opportunities for participants to be acquainted with one another, participants are introduced to the concept of reflection, with them sharing their understanding of reflection, reflecting on a nominated literature article on reflection, and then reflecting on reflection in their workplace.

Stage 3, Information exchange, and Stage 4, Knowledge construction

The researcher has merged the information exchange and knowledge construction processes (Stage 3 and Stage 4). For each clinical topic, participants start the information exchange by sharing with their peers the how, what and whys of their workplace protocols. The information exchange phase therefore constitutes the practical performance knowledge of 'knowing how' and the theoretical conceptual knowledge of 'knowing why' (Ryan et al., 2000, p. 35). The next activity requires each participant to begin his/her own learning by reading a nominated article on the topic and completing the '3Rs' exercise. The latter activity requires the participants to Read the recommended literature, to Reflect on the reading, and after posting his/her reflections online, to Respond to at least one of their peers' contributions. Stage 4 of knowledge construction is modified to require each participant to search, retrieve and evaluate a relevant article from an electronic library database and sharing their reasons for recommending the article to their online peers. The final learning activity for Stage 3 and Stage 4 is the sharing of each participant's reflections on his/her learning. These series of activities are repeated three times with three different topics.

Repeating activities that follow a predictable format has the benefit of assisting participants to internalise reflection, thereby increasing the chances of participants reflecting on a more regular basis (Nuthall, 2002). Repeated reflection increases the likelihood of participants applying their newly acquired reflection skills at their workplace. Moreover, adopting a

repetitive approach also allows participants to spend increasingly more time reflecting on reading and engaging in reflective dialogues and less time on perfunctory tasks of literature searches (Nuthall, 2002). Together, participants' familiarity with the literature search and reflection result in them being more prepared and confident as they move on to Stage 5.

There are a number of reasons for adopting this structured sequence of learning activities. The first set of exchanges consists of participants sharing their existing professional experience. Participants' clinical expertise forms the common building block for further construction of new knowledge (Colyer, 1997; Nuthall, 2002). Sharing workplace protocols by articulating the theories of workplace practices is the first step in advancing workplace practices. Failure to state explicitly existing work practices will prevent identifying things that need to be changed or learned (Argyris & Schön, 1974). Moreover, discussing and reflecting on workplace protocols also has immediate relevance because participants are able to continue their online discussions and knowledge construction with their colleagues in the workplace (Alleman & Borphy, 1994).

The second set of reflective dialogues is based on participants reading a nominated article. Any major perspective transformation of a profession as a collective will need to start first with individual perspective transformation (Mezirow, 1990b). Providing opportunities for participants to reflect on their reading is one way of making individual perspective transformation possible. Thus, the focus in Stage 3 is for participants to concentrate on their reading, reflection and reflective dialogues.

Advancing of workplace practices must be grounded in evidence (Ghaye & Lillyman, 2000). Hence, it is important that practitioners have the ability to retrieve, critique and apply relevant information to solve specific clinical issues (Birkenholz, 1999). Stage 4 therefore requires each participant to conduct a literature search. However, searching alone does not equate to learning (Colaric & Jonassen, 2001). Aside from retrieving a literature article, they also need to evaluate their selection to ensure it is relevant before sharing it with their peers. This also has the benefit of multiplying the learning resources that are of interest to the community of practice. One common reason cited for learners failing to reflect is unrealistic course expectations in the nominated timeframe (Light & Cox, 2001). Thus, to prevent overloading participants and to keep the learning activities within the recommended timeframe, the researcher did not specify reflection to be a required activity here.

Stage 5, Development: Evidence-based practice

Relevance is the key to success in adult learning (Birkenholz, 1999). There is a perception amongst some practitioners that formal education is too theoretical to be of direct relevance in the workplace (Colyer, 1997). Thus, there is a need to provide learning that is authentic, meaningful and relevant to practitioners with the opportunity for immediate application of the newly acquired knowledge (Birkenholz, 1999; Colyer, 1997; Reeves et al., 2002). One such application is evidence-based practice (EBP).

"Safe and accountable practice is evidenced-based" (Wong et al., 1995, p. 109). As part of quality care, there is a need to incorporate evidence-based practice (Baird, 1998). Healthcare professionals are now expected to review consistently and reflect on their practice (White, 2002). One way of developing a culture whereby evidence is valued over opinions is by cultivating and developing communities of practice (Ghaye & Lillyman, 2000).

Moreover, most MRS practitioners are protocol driven and few are given the opportunities to reflect critically on their workplace practices, least of all, opportunities to participate in EBP learning (Sim, 2000). Introducing the concept of EBP as part of CPD program provides opportunities for practitioners to participate in EBP thereby increasing their awareness and appreciation of their potential contribution to advancing workplace practices. For the researcher, this holds one means of empowering participants.

EBP builds upon the practitioner's clinical expertise and knowledge by integrating the appropriate literature and up-to-date evidence, to enable the practitioner to make the best possible decision for clinical practice, as opposed to decision making that is solely based on opinion and experience (Leape, Berwick, & Bates, 2002; Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000; Silagy & Weller, 1998). Evidence-based approaches have now been adopted in many health professions such as dentistry, nursing, physiotherapy, mental and public health (Trinder, 2000). The promotion of EBP within healthcare as one of the means towards enhancing quality has made information literacy skills an essential survival skill in today's workforce. To this end, the importance of practitioners in using their clinical expertise to critically appraise literature, their ability to conduct literature search online, and to reflect on the available evidence and current practices, is paramount. Learning and applying EBP online is therefore not only relevant and authentic but also a meaningful form of learning for participants of this community of practice.

The two learning objectives, reflection and professional knowledge, culminate in the final 'product' of the EBP assignment in Stage 5. Thus, while all learning activities in Stages 1 to 4 by themselves also achieve the learning objectives of reflection and increase in professional knowledge; the knowledge constructed, reflection and information literacy skills acquired through the first four stages ultimately form the EBP foundations and prepare participants in accomplishing the final stage of EBP development. Participants are now ready to put together their learning and construct their own knowledge via EBP in their workplace (see Figure 2.3).

As adult learners in the online module, participants are made "partners in the learning process" (Corder, 2002, p. 8). While the researcher determines the overall objectives of the module, participants are given the flexibility in determining their intermediate goals. Thus, within each clinical topic, instead of the moderator specifying the issues, participants are given the choice to choose the issues they wish to discuss, with the moderator ensuring that the issues and discussions are within the parameters of the chosen topic. In addition, they are given the freedom to select the clinical issues they wish to investigate for their EBP assignments. Self-evaluation is the most relevant way of determining if the individual desired learning outcomes have been achieved (Birkenholz, 1999). To assist learners to be more self-directed in their learning, participants are required to reflect on and evaluate their own learning outcomes at regular intervals. In summary, learning assumes a constructive approach, is learner-centred and authentic, with reflective dialogues occurring within a community of practice, and participants are given autonomy for learning within a structured learning environment.

Learning outcomes

Learning outcomes are likely to occur if learning is cumulative, active, self-regulated and goal-oriented (Shuell, 1992). In the online module, learning is cumulative as participants are expected to reflect on and build on their knowledge and online skills progressively throughout the module. Learning is active as participants are responsible for their own learning, with each assuming an active role by reflecting and co-constructing their own knowledge. Reflection takes place at both an individual and collaborative level, with participants posting their personal reflections on the discussion forum and then reflecting collectively via their exchanges. By engaging in reflective dialogue and learning collaboratively, practitioners continuously engage with one another in framing and re-framing problems, and exploring possible solutions (Hawkes & Romiszowski, 2001, p. 289), thereby giving meaning to and

advancing their practices (Clouder, 2002; Ghaye & Lillyman, 2000). Constructivist learning and reflection are appropriate forms of learning in this educational framework, with practitioners supporting one another in their professional and personal development through co-construction and reflection (Bolton, 2001; Sugerman et al., 2000). Self-regulation, reflection and goal setting are part of metacognition (Goodyear, 2002). Throughout the module, participants are provided with the opportunities to reflect, evaluate, and monitor their own learning, thereby assisting participants to acquire the metacognition skills.

As reflection is embedded into the learning activities, participants are constantly reflecting on professional knowledge, practice and on their learning. As part of constructive alignment, in terms of learning outcomes, it follows that participants will be able to reflect in the workplace and their professional knowledge will be enhanced. In addition, having participated in literature search and EBP, it is anticipated that they will be able to use information literacy skills and EBP to advance their professional knowledge and to communicate effectively as members of a community of practice online.

In line with constructive alignment, the appropriate forms of assessment tasks for reflection include tasks such as a reflective journal, peer and self-assessment. In addition, to accommodate the different learning outcomes, a variety of other assessment approaches are needed (Brown et al., 1997; Cobb & Solomon, 1999; McLoughlin & Luca, 2003; Gibbs & Simpson, 2005). For instance, contributions on the discussion forum can also be used to assess collaboration and interpersonal skills while feedback from moderators and peers can also serve to provide feedback on learners' learning (Boud, 1995; McLoughlin, 2003).

Learner support: scaffolding, modelling and coaching

In order to assist participants to engage successfully in the process of knowledge construction, support in the form of scaffolding, modelling and coaching is essential (Cobb, 1994; Salmon, 2003). Scaffolding is a structured process of hints and suggestions embedded into the course (Jonassen, 2001; Weigel, 2002). It may also assume the form of resources, related case studies, and facilitators and peer support (Dabbagh & Bannan-Ritland, 2005; Jonassen, 2001). Scaffolding enables participants to complete learning activities that are beyond their existing competence. With the completion of each task of increasing difficulties, participants' competence progresses at a much more rapid rate than it would otherwise be possible without scaffolding (Weigel, 2002).

"Modelling is the externalisation of internal cognitive processes" (Weigel, 2002, p. 10). Modelling makes explicit the strategies towards problem solving, critical analysis and creativity by providing examples of successful problem solving. The aim is to allow participants to reflect on their own performances against that of the teachers' and improve to their performances (Dabbagh & Bannan-Ritland, 2005).

In coaching, the moderator facilitates participant learning by monitoring, evaluating and providing feedback on participants' performance either via email or discussion boards (Jonassen, 2001; Weigel, 2002). Scaffolding, modelling and coaching can be easily implemented on the Blackboard or WebCT platforms through their functionalities, such as resource link, course document, email and discussion board.

The educational framework for CPD in MRS and how the online module will be actualised has been presented. The focus now shifts to choosing an appropriate evaluation model to evaluate the online module. The next section includes a review of current evaluation models and the rationale for selecting Kirkpatrick's Four Level Evaluation model as the model for evaluating the online module.

2.5 Evaluation of online module and educational framework

This section presents a review of four evaluation models that are relevant for education programs, provides a detailed description of Kirkpatrick's Four Level Evaluation and outlines the reasons for choosing Kirkpatrick's model as the evaluation model for the study. In the present study, 'educational program' refers to the CPD program.

Educational evaluation involves "the collection of data relative to needs, objectives, methodology, support material, use of technology, and content to make time decisions about instructional effectiveness" (Hale & French, 1999, p. 166). To this end, evaluation consists of a systematic process of data collection, and data analysis followed by inquiry, judgment and recommendations (Boulmetis & Dutwin, 2000). These involve establishing the criteria (objectives) of the educational program, collecting, analysing and synthesising the data, and judging the worth and merit of the program in relation to the established criteria. Worth refers to "the extent to which the program is essential to the organisation's mission" while merit is

determined by “its performance against established standards of excellence in the profession” (Guskey, 2000, p. 43). In general, educational or CPD programs should be designed so as to be of high quality and relevance. However, in reality, a program can be determined to be of high quality but of little worth to the workplace if the program does not meet its needs (Guskey, 2000). Finally, based on the above findings, the process culminates in providing recommendations on the program. The aim here is not only in determining the extent to which objectives have been achieved but also to inform decision making such as the continuation, cessation or how to further improve an educational program (Breakwell & Millward, 1995; Fitzpatrick, Sanders, & Worthen, 2004; Guskey, 2000; Owen & Rogers, 1999). Evaluation of an educational programs therefore goes beyond learners’ assessment and is an analytical process that involves a judgement of its value (Bastiaens, Boon, & Marten, 2004; Breakwell & Millward, 1995).

2.5.1 Evaluation bias

No evaluation is free of bias, since every evaluation approach is inevitably influenced by the evaluator’s philosophy and other factors such as financial consideration and organisation politics (Fitzpatrick et al., 2004). A common form of bias is for evaluator(s), either consciously or subconsciously, allowing their perspectives and their preference for positive findings to influence their judgment. One way of reducing this form of bias is for the evaluator to keep a reflective journal and to include peer observations as part of the data collection (Fitzpatrick et al., 2004). In the present study, the researcher kept a reflective journal to assist in keeping track of evolving thoughts, major unfolding of events and new insights. The reflective journal therefore assisted the researcher to reflect on the progress of the program. In addition, as the researcher is working with a team of facilitators, their reflective journals also provide an independent and additional perspective, providing the external check to counter any researcher’s prejudices, if any.

2.5.2 Evaluation models

Over the years, several evaluation models have been developed, with each model offering advantages and limitations, depending on the theoretical perspectives from which the models were derived (Guskey, 2000). The decision as to which evaluation model is suitable is dependent on the objectives of the evaluation.

Tyler's Goal-based evaluation model

Tyler's Goal-based evaluation is one of the earliest and simplest evaluation models available, providing clarity and objectivity that were lacking in earlier evaluation models (Guskey, 2000). It involves the systematic evaluation of a program based on specified objectives, with the aim of determining the extent to which these objectives were achieved (Bramley, 1991; Guskey, 2000). The aim of evaluation here is to measure the specified outcomes, using both quantitative and qualitative approaches (Boulmetis & Dutwin, 2000). One drawback of goal-based evaluation is that only outcomes that have been specified are evaluated, thereby excluding other important outcomes that might have not been anticipated.

Scriven's Goal-free model

In the Scriven's Goal-free model, instead of restricting the evaluation to intended outcomes, the focus is on evaluating all actual outcomes (Boulmetis & Dutwin, 2000; Bramley, 1991; Guskey, 2000). However, this model is also one of the most difficult to implement due to the absence of specific guidelines (Boulmetis & Dutwin, 2000; Bramley, 1991). Hence to increase accuracy and to reduce the possibility of evaluator bias, Scriven proposed using two evaluators instead of relying on a single evaluator's report (Guskey, 2000). Both Tyler's Goal-based evaluation model and Scriven's Goal-free evaluation model served to highlight the need to adopt an inclusive approach in evaluating program outcomes (Guskey, 2000).

Stufflebeam's evaluation model

Stufflebeam's model focuses on collecting information and evaluating a program with the aim of assisting decision-making. This is a comprehensive model that examines four interrelated components: context, input, process and product as part of the evaluation process (Stufflebeam, 2000). Context evaluation examines the needs and problems of an organization and hence the rationale for establishing program goals and activities (Guskey, 2000). Input evaluation assesses resource allocation while process evaluation looks at the implementation process, identifying any deficiencies that require remedial action (Stufflebeam, 2000). Product evaluation examines the final outcomes of the process. This data is then used to inform decision makers on the future of the program by improving, modifying or even terminating the program (Guskey, 2000).

2.5.3 Kirkpatrick's Four Level Evaluation Model

For 40 years, Kirkpatrick's model has been one of the most prominent and commonly used evaluation models in business and industry (Bramley, 1991; Guskey, 2000). Kirkpatrick's model evaluates the quality, efficiency and effectiveness of the educational programs (Guskey, 2000; Kirkpatrick, 1998; Turner, 1999). Due to its simplicity and practicality, Kirkpatrick's model is also a useful evaluation model for online learning (Bastiaens et al., 2004).

Kirkpatrick's model is hierarchical consisting of four levels of evaluation, namely reactions, learning, behaviour and impact (Bramley, 1991; Kirkpatrick, 1998; Turner, 1999).

- Level 1 (Reaction) refers to the level of participants' reaction to the training program. Kirkpatrick defines it as "a measure of customer satisfaction" (Kirkpatrick, 1998, p. 19). Given that motivation to learn is dependant on participants' positive reaction, the importance of Level 1 cannot be underestimated. Information obtained here can also inform teachers as to how the program can be further improved (Boulmetis & Dutwin, 2000; Kirkpatrick, 1998).
- Level 2 (Learning) refers to "the extent to which participants change attitudes, improve knowledge, and/or increase skill as a result of attending the program" (Kirkpatrick, 1998, p. 20). A change in at least one of the factors, knowledge, skills or attitudes, must first occur before any subsequent behavioural change can take place. As most programs aim to increase participants' knowledge and skills, Level 2 evaluation focuses on the effectiveness of a program, in terms of the extent to which the program's objectives have been met (Guskey, 2000).
- Level 3 (Behaviour) refers to "the extent to which change in behaviour has occurred because the participant attended the training program" (Kirkpatrick, 1998, p. 20). Here, the evaluator aims to determine if the learning acquired by the participants in Level 2 has been successfully applied on the job resulting in improved performance (Boulmetis & Dutwin, 2000; Guskey, 2000; Turner, 1999).
- Level 4 (Impact) refers to "the final results that occurred because the participants attended the program" (Kirkpatrick, 1998, p. 23). These results could include changes in workplace performance such as increased productivity, reduced production cost, higher profits or may include outcomes that are much more difficult to quantify such as increased morale, motivation and empowerment (Kirkpatrick, 1998; Turner, 1999). Also known as impact

evaluation, Level 4 evaluation seeks to determine the long-term effect of participants' learning on the workplace. Thus, while the first three levels focus on participants' learning, Level 4 evaluation assumes a macro perspective and centres on participants' workplace (Boulmetis & Dutwin, 2000).

To address the difficulty of determining the impact of participants' learning on workplace performance, Hamblin (1974) suggests setting objectives that are achievable by keeping Level 4 goals focused and measurable and evaluating learning outcomes against the established criteria (as cited in Bramley, 1991). Hamblin (1974) has also added a fifth level to Kirkpatrick's model; economic value and human good while Kaufman and Keller (1994 as cited in Guskey, 2000) have included societal value in the fifth level.

The data from each level of evaluation provides a different aspect of participants' learning and all four levels must be taken into consideration when evaluating a program (Guskey, 2000). For instance, a participant who did not show any evidence of behavioural change in the workplace (Level 3), does not necessarily imply that he or she has not acquired any learning (Level 2) from the program. This is because behaviour changes can take place only if the workplace environment permits such a change to occur. If a participant is aware that the workplace supervisors frown upon any workplace suggestions that derail routine practices, than he or she is unlikely to engage in any new behaviours. A workplace environment that encourages and rewards participants in applying their learning is a prerequisite for Level 3 application (Guskey, 2000). According to Kirkpatrick (1998), each level of evaluation must therefore be conducted in sequence with a view to providing an overall picture of the effect of the program.

The online module, embedded within the educational framework, is designed to assist MRS practitioners in their CPD. CPD is not only about enhancing participants' learning, it is also about learning that will change participants' behaviour, which in turn results in changes in their performance in the workplace (Henwood, 2000b, 2003; Kirkpatrick, 1998). In both Tyler's and Scriven's models, evaluation is restricted to evaluating only the learning outcomes of the module (Level 2) and therefore are inadequate. Stufflebeam's model, while useful, is more suited to a comprehensive review of an entire program, from planning of the program to cessation of the program and includes areas of evaluation that are beyond the scope of this current study. Kirkpatrick's model on the other hand, evaluates not only the

learning outcomes of the module (Level 2), but also evaluates any changes in participants' behaviour or attitude (Level 3) and the corresponding impact such learning has in the workplace (Level 4). Moreover, Kirkpatrick's model adopts an inclusive approach of evaluation, involving stakeholders such as participants, teachers, workplace supervisors and employers (Bastiaens et al., 2004). Thus Kirkpatrick's model is ideally suited to evaluate CPD programs and is an appropriate evaluation model for the present study.

The final section examines the competitive nature of CPD education and identifies the major CPD providers for MRS in Australia.

2.6 Educational providers for Continuing Professional Development

The exponential growth of information and communication technologies has resulted in an increase in demand for professional education and customisation of education (Mahel, 2000; Nixon & Helms, 2002). The introduction of mandatory CPD for many professions has also added to the need for more professional development courses. However, although traditionally universities have been the provider of CPD, they are no longer the sole providers of CPD courses.

Globalisation and changing political and economic constraints are increasingly eroding the monopoly of universities as the creators, innovators and disseminators of knowledge. With the advent of technology making virtual classrooms a reality, competition between education providers has now intensified (Hagen, 2002; Wood, Tapsall, & Soutar, 2005). Universities are facing strong competition from corporate universities and private providers such as professional associations and specialist content providers. Corporate universities, which align their education objectives with the organisation's vision and culture, are gaining increasing popularity (Bjarnason, 2004; El-Tannir, 2002; Frazee, 2002). Faced with diminishing resources, some universities are developing specialised curricula to meet the specific needs of corporate companies while other universities are forming strategic alliances with one another, with private providers or with corporate universities (Bjarnason, 2004; El-Tannir, 2002; Hagen, 2002; Knox, 2000; Nixon & Helms, 2002). An example is Universitas 21, an international consortium of research-intensive universities from East Asia, Australia, New

Zealand, Europe and North America, working in partnership with a private corporation to deliver online courses (Bjarnason, 2004).

So, who are the CPD providers for MRS in Australia? In Australia, commercial corporations have yet to assume a competitive role as a major CPD provider for MRS. Commercial companies operates on a more ad-hoc basis, using a just-in-time learning approach. With the introduction of new technology into clinical practice, commercial companies will provide a series of in-house training for their clients, plus a series of seminars and workshops conducted through MRS professional associations. The current major MRS providers of CPD activities are universities, clinical centres and professional associations, with universities being the current major providers offering formal awards. Although MRS Schools in Australia currently do not have to compete with corporate universities and private education providers for programs leading to formal awards, the competition within the higher education sector is intense. This is compounded by the fact that only a minority of MRS practitioners are engaging in formal studies, with the majority opting for in-house seminars, workshops, conferences and self-directed study as their preferred CPD activities (Brown, 2003b; Sim, 2004). Given the limited demand, there are currently no overseas educators providing MRS CPD program operating in Australia. Hence little is known about the issues of learning collaboratively in a trans-national and cross-cultural context in MRS community. However, it is anticipated that the different protocols adopted by various centres and different countries will pose considerable challenges amongst MRS practitioners in establishing a common understanding. As such, it is imperative that any overseas educators, operating in Australia or offshore, must take into consideration the varied protocols when designing CPD activities for MRS practitioners by providing opportunities for such exchanges to take place.

Although MRS professional associations and clinical centres are also major CPD providers, for the purpose of the present study, the researcher is focusing on the university as the CPD provider. Against the background of globalisation, changing political and economic factors, universities, specifically MRS Schools, are facing major challenges in ensuring that their CPD programs are well grounded in educational theories and address the needs of the MRS practitioners, as well as revenue raising. Several factors such as information technology infrastructure and library resources, such as electronic databases, gave universities an advantage over other current MRS education providers. These are important factors when

considering the question of commercial viability of online CPD programs. The issue of commercial viability will be discussed in Chapter 6 (Section 6.2.3).

2.6 Summary of Chapter 2

Deregulation, reduced operating costs, new ways of organising the professional workforce, increasing competition within the healthcare sector and increasing consumer expectations are factors that threaten the existence of any profession (Gold et al., 2002). The greatest obstacle facing the MRS profession is neither medical dominance nor a competitive healthcare environment, formidable challenges though these maybe. Rather, the greatest obstacles confronting the MRS profession are low professional self-esteem, apathy and lack of motivation and willingness to learn. These result in MRS practitioners being unwilling to assume increased clinical responsibility and, adversely impact upon their ability to constantly advance clinical practice and to provide better quality care for their patients amidst the rapid socio-economic, political and technological changes.

To be effective health practitioners and for the profession to survive, practitioners "must be activists in the development of policy, not simply reactors" (Brennan, 2002, p. 2087). It is only when MRS practitioners are empowered that they are able to assume an active role in advancing clinical practice and in their professional development. To this end, although changes in the undergraduate curriculum can assist the younger generation of practitioners, there is an urgent need to have a structured process in place to help existing MRS practitioners.

Reflection is now widely promoted in healthcare professions as one of the means of enhancing clinical practice and improving healthcare delivery. Using reflection as one of the learning strategies for CPD can also assist MRS practitioners in improving their low self-esteem as they reflect on their current responsibilities and professional status within the healthcare professions. As such, reflection forms the focus of CPD for MRS practitioners in the present study; an effectively designed CPD program is one way of empowering practitioners and to assist them in the development of those professional attributes that will enable them to meet the current and future needs of the profession.

Technology innovation, ease of Internet access, mass education and the greater emphasis on flexible learning has resulted in universities worldwide adopting online learning as part of their teaching and learning. Offering CPD programs online provides the possibility of financial incentives an important consideration that cannot be overlooked in these days of increasing competition. More importantly, offering CPD programs online is no longer a lonely, frustrating and impersonal experience. With computer-mediated communication it is now possible to provide authentic, meaningful and learner-centred learning online. The creation of a virtual learning community paves the way for reflection, constructive and collaborative learning to occur online. Based on the learning and teaching theories of constructivism, learner-centred learning and situated learning, and using computer-mediated communication to make possible the instructional frameworks of constructive alignment and Salmon's 5-stage model, an online module based on the above educational framework is presented.

Evaluation is an essential part of educational research (Mcpherson & Nunes, 2004). Kirkpatrick's four level evaluation model is the appropriate evaluation model in the present study. This is because, unlike some evaluation models that focus solely on the learning outcomes, the model adopts an inclusive approach, evaluating participants' learning outcomes, changes in behaviour and the corresponding impact that participants' learning has in the workplace.

The next chapter describes action research, the research methodology employed in the current study, detailing the rationale its use and the quantitative and qualitative approaches adopted.

Chapter 3

Research Design

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3.2 Research methodology
3.2.1 What is action research?
3.2.2 Why action research?
3.3 Overview of research framework
3.3.1 Data collection
3.3.2 Data analysis
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3.4 First Research Phase: Data collection
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3.4.2 Interviews

Chapter 3 describes the research design used in the present study. The chapter begins by briefly revisiting the aims of the study, detailed in Section 1.4. This is followed by a description of action research, the rationale for choosing this method and an overview of the research framework. The next sections focus on the data collection techniques used. Specifically, the quantitative and qualitative approaches adopted, the procedures used to analyse the data, and the reliability, validity and generalisability of data in action research are described and justified. The chapter concludes with a description of the First Research Phase data collection.

3.1 Aims of study

Research Question 1 forms the main aim of the present study: i.e. what are the design features of an educational framework needed for a CPD program to meet the current and future needs of the MRS profession?

However, in order to answer Research Question 1, the study needs first to address three other related research questions:

- Research Question 2: What, according to practitioners and Heads of Clinical Departments (HODs) are the attributes required by practitioners to address the future needs of the MRS profession?
- Research Question 3: What are MRS personal perceptions of themselves as professionals?

- Research Question 4: In terms of workplace culture, what are the factors that influence MRS practitioners' decisions to engage in CPD?

The research study was divided into 2 phases: the First Research Phase addressed Research Questions 2 to 4 while the Second Research Phase addressed the main research question, Research Question 1.

3.2 Research methodology

Action research is the chosen research methodology for the present study. The cyclical process of action research provided an ideal mechanism to design, implement, evaluate, reflect on and modify the educational framework used to guide the design and development of an online CPD program for MRS practitioners. Data collected from the needs analysis were used to inform the researcher of practitioners' needs, thereby guiding the development of the online CPD module. The module was first piloted with a group of practitioners, with the researcher reflecting on and using the feedback to evaluate and re-develop the module which was piloted again with a second group of practitioners.

3.2.1 What is action research?

"Action research is a process of systematic reflection, enquiry and action carried out by individuals about their own professional practice" (Frost, 2002, p. 25). Action research is a participatory process with practitioners assuming the role of the researcher and conducting research about their workplace practice (Allen, 2005; Dick, 1999; McNiff, Lomax, & Whitehead, 1996; Schwalbach, 2003). Action research contrasts with most social science research where a researcher is required to adopt a non-intervention approach. Through a systematic process of inquiry, data collected are analysed and reflected on (Schwalbach, 2003). It is this systematic approach of inquiry that distinguishes action research from the everyday actions of practitioners (Tomal, 2003).

Dick (2002, ¶ 1) further defines action research as a "flexible spiral process which allows action (change, improvement) and research (understanding, knowledge) to be achieved at the same time". Action research narrows the gap between theory and practice, integrating the 'practical know how' (techniques) and 'rational know that' (concepts) that lead to improved

professional outcomes (McNiff & Whitehead, 2002, p. 35; Schwalbach, 2003). The cyclical pattern is one of the defining features of action research; alternating between action and critical reflection results in the progressive accumulation of practical knowledge that leads to improved practice (Dick, 1999; McNiff et al., 1996). Hence, action research has been defined as the "interplay between practice, reflection and learning" (McNiff & Whitehead, 2002, p. 13).

Another feature of action research is its collaborative nature involving wider community participation (Mcpherson & Nunes, 2004; Tomal, 2003). Participants of action research are often practitioners in the field being studied and include stakeholders in the professional community. The practitioners are no longer "objects" to be studied, but assume the role of contributors (McNiff et al., 1996). This inclusive approach has three major advantages. First, the input and participations of the peers reduces personal biases and is therefore a useful way of informing research (McNiff et al., 1996). Second, the combined input from research participants also results in a much more committed and democratic process, leading not just to improved practice but also to the advancement of knowledge (Greenwood & Morten, 1998; McNiff et al., 1996). Third, because of stakeholders' involvement, action research brings about improved practice in the context of the study (Schwalbach, 2003; Tomal, 2003). Although the strength of action research lies in its application in the field being studied, the findings from action research are equally applicable in the wider field of study (McMillan & Schumacher, 2006).

In summary, action research differs from other research because of its practical approach to problem solving, its cyclical pattern of action and reflection, its involvement of stakeholders in the research process and its focus on improved practice as part of the research outcomes (Denscombe, 1998 cited in Costello, 2003). Although several models of action research are available, the common elements of action research include identifying the problem, collecting the data, analysing and interpreting the data, action planning, evaluating, reflecting and modifying the action plan (McNiff et al., 1996; McNiff & Whitehead, 2002; Mills, 2003).

3.2.2 Why action research?

Action research was the selected research methodology for the present study for the following reasons. First, the aims of the present study fit into the action research process. The main aim

of the study was to design and develop an educational framework to assist MRS practitioners in their CPD. Data gathered through action research informed and assisted in the planning of the educational framework. In addition, the cyclical action of action research is ideal as the spiral process of planning, implementation, evaluation, and reflection allows refining of the educational framework.

Second, action research results in improved professional practice (McNiff & Whitehead, 2002). Action research is therefore of relevance in healthcare professions and teaching where continuing advancement of professional practice is an essential part of professionalism (Kember & Kelly, 1993; McNiff et al., 1996; Noffke, 1995; Salmon, 2002b). Given that improved professional practice is one of the aims of the CPD educational framework, action research is an appropriate methodology for the study.

Third, the cyclical pattern of action research provides the means through which reflective practitioners can reflect on their professional practice (Costello, 2003). Given that reflection forms the focus of the CPD program in the present study (see Chapter 2, Section 2.4.1), providing opportunities for MRS practitioners to participate in action research is appropriate.

Fourth, participants of action research can bring about changes in their professional practice through their involvement in action research. Stakeholders are therefore able to claim ownership of the research process and the improved outcomes. Thus, practitioners are more likely to support and adopt improved professional practice when it is one of their own doing the research (McNiff et al., 1996; Mills, 2003).

Fifth, the present study concerns educational research. Action research involves educational research since action research has “always to do with learning, and learning to do with education and growth….” (McNiff & Whitehead, 2002, p. 15). The study focuses on creating learning outcomes that are relevant to MRS practitioners and in designing the educational framework; the researcher has in mind practitioners’ empowerment. According to Greenwood (1998), the reflective element of action research can bring about knowledge that can lead to empowerment of practitioners.

Examples of action research in MRS ranged from development of clinical assessment procedure and curriculum development in radiography education for undergraduate and

postgraduate programs to quality assurance in radiology department (Burchell, 2000; Burchell, Higgs, & Murray, 1999; Kember & McKay, 1996; Potter, Morgan, & Thompson, 1994)

One feature of action research, which has not been included in the present study, is the emphasis on action research as the means for social change (McNiff & Whitehead, 2002). Some research scholars suggest that the validation of the worthiness of action researcher's aims and actions is an important criterion of action research (McNiff et al., 1996; Reason, 2000). These action research scholars place much of their emphasis on the actual process of establishing and determining the exact value of the action researchers' aims and actions. While there is no doubt that the outcomes of the present study would benefit patients, the MRS profession and the MRS workplace, aside from stating succinctly the aims and expected outcomes and benefits of the study, the researcher has intentionally moved away from the process of espousing the values of her aims and actions.

Thus, the features of action research adopted in the present study included its cyclical pattern of action research, its participatory nature, its practical nature and its focus on improved outcomes. In the present study, the improved outcome was in the form of an educational framework for a CPD program that will meet the current and future needs of the MRS profession.

3.3 Overview of research framework

Figure 3.1 provides an overview of the research framework used in the present study. The study consisted of two major phases.

The First Research Phase consisted of the literature review and data collection. While the literature review assisted the researcher in the design of the educational framework, the data collection paved the way in informing the researcher of practitioners' learning needs. As part of the cyclical pattern of action research, the results of the literature review and needs analysis data served two main objectives. First, they enabled the researcher to refine the research questions for the study (Action Research cycle 1). Second, they informed the researcher in the design of the educational framework for CPD.

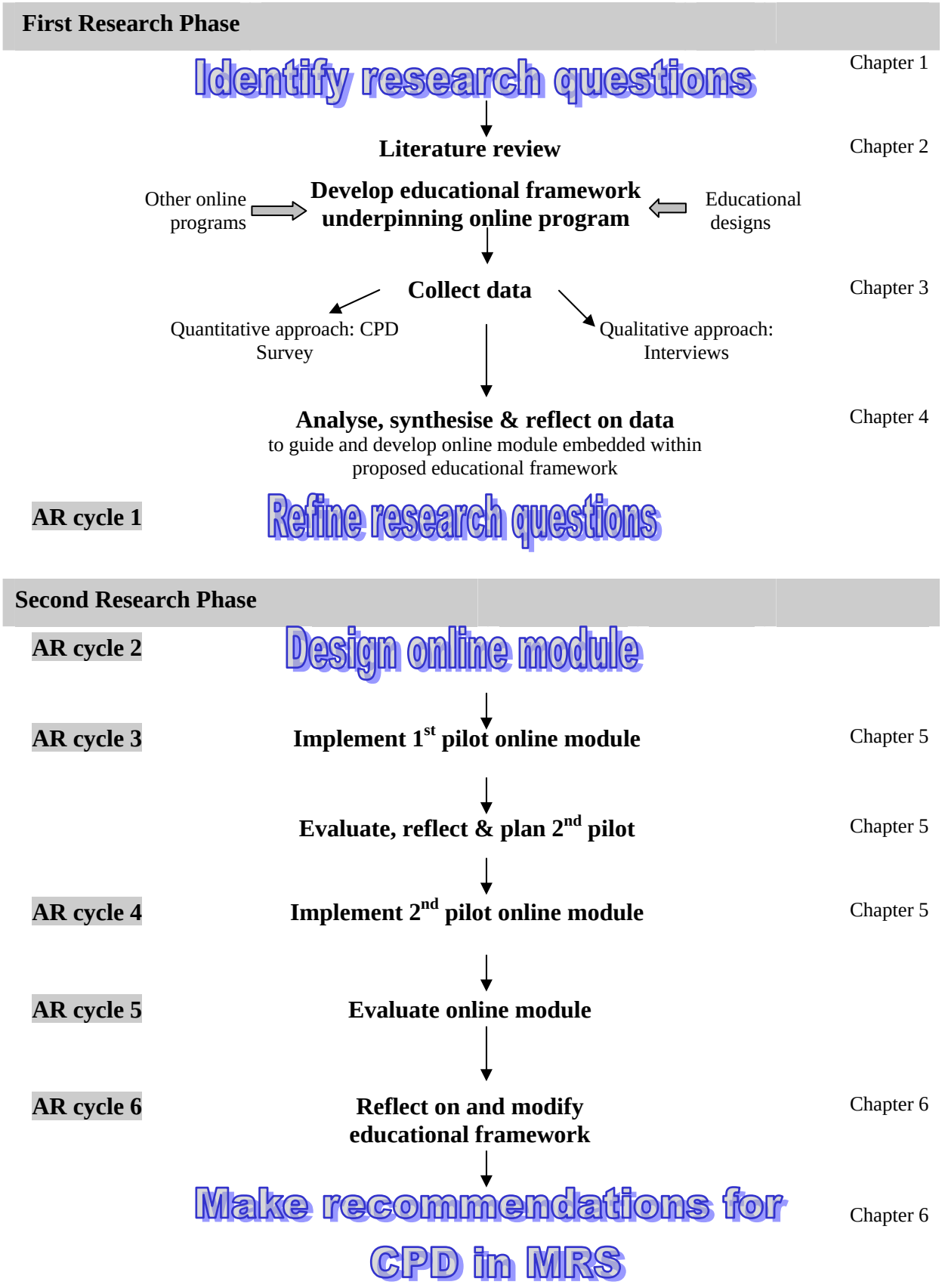

Figure 3.1
Overview of research framework

Note. AR = Action Research

Based on the educational framework, an online module was developed (Action Research cycle 2).

The Second Research Phase focused on the implementation and refinement of the online module. The cyclical process of action research was used to pilot the module with a group of MRS practitioners (Action Research cycle 3). Upon completion of the 1st pilot module, data collected were analysed, evaluated and reflected on and used to refine the module, 2nd pilot module, was piloted with another group of MRS practitioners (Action Research cycle 4). Analysis and reflection on the processes and outcomes of the online module (Action Research cycle 5) formed the cornerstone for the CPD recommendations in the MRS profession.

3.3.1 Data collection

Both quantitative and qualitative approaches were used to collect data during the First and Second Research Phases. The combination of these two approaches is common in action research as it provides richer data and new ideas or perspectives that otherwise would not be available using a single approach (Mcpherson & Nunes, 2004; Miles & Huberman, 1994; Schwalbach, 2003). Multiple data collection strategies allow for data triangulation and for better understanding and clarification of the research problem (Brannen, 1992; McMillan & Schumacher, 2006; Miles & Huberman, 1994; Yegidis & Weinbach, 1996). These strategies allow cross-data validity checks, thereby increasing the rigour, validity and credibility of the findings (Patton, 2002).

Data collection strategies used in the First Research Phase included surveys and semi-structured interviews. The purpose of the data collection was to get input from the clinical workplace to guide the development of the education framework for CPD programs (Borbasi & Emden, 2001).

In the Second Research Phase, the aim was to develop an online module based on the CPD educational framework. In line with the participatory nature of action research, other MRS stakeholders collaborated with the researcher in piloting the online module. These stakeholders included two senior MRS practitioners and one MRS academic staff who assumed the role of facilitators in supporting and facilitating learning amongst participants of the online module.

Participants in the online module were MRS practitioners (henceforth referred to as 'participants') who volunteered to participate in the study. To avoid the possibility of a perceived conflict of interest and learners' perception of obligation and dependency upon the researcher, participants of the online module were not students at RMIT University during their involvement in the online module. In addition, as the pilot module formed part of the doctoral study and not part of the University curriculum, there was no formal award upon completion of the module.

Kirkpatrick's four level evaluation model was the chosen model for evaluating the online module (see Chapter 2, Section 2.5.3). The model allows for the evaluation of participants' reaction to the program (Level 1), participants' learning (Level 2), behavioural change as a result of participation in the module (Level 3) and evaluation of the impact of participation in the workplace (Level 4) (Baskin, 2001; Kirkpatrick, 1996).

Table 3.1 shows the data collection strategies for each level of evaluation. The collection strategies were chosen for two reasons. First, the methods were selected to address the objectives of each evaluation level. Second, they were chosen to complement the strengths and weaknesses of each method and to provide different perspectives of the data collected (Breakwell & Millward, 1995).

Table 3.1
Kirkpatrick's four level evaluation model and corresponding data collection strategies

Evaluation level		Data collection strategies
1	Reaction data	Mid module survey Post module survey Messages posted at discussion forum
2	Learning data	Pre-module survey and Post module survey Content analysis of reflection postings via Boud et al framework Content analysis of other learning outcomes via learning objectives of online module Facilitators' reflective journals Participants' learning portfolio
3	Behavioural data	Workplace survey (to be completed by Supervisor) EBP assignment assessment Messages posted at discussion forum 3-month post module survey
4	Impact data	Workplace survey 3-month post module survey Learning portfolio of participants Continuing communication with participants

Source: Adapted from (Kirkpatrick, 1996; Kirkpatrick, 1998)

Data were collected from multiple sources using both quantitative and qualitative approaches. Quantitative approaches included pre, mid and post module surveys while qualitative approaches included participants' postings at online discussion forums, participants' learning portfolio and minutes of the researcher's meeting with facilitators, as well as the researcher's reflective journal.

The learning portfolio allowed participants to keep records of their learning and reflections. In the present study, the learning portfolio also served as another useful source of data triangulation. The minutes kept track of decision-making and the researcher and facilitators' evolving thoughts and served as a useful source for further review as the study progressed (Eisenhardt, 2002). The reflective journal is an important form of data collection in action research and serves as a useful means of recording the researcher's reflections throughout the study (Mcpherson & Nunes, 2004). The researcher's reflective journal consisted of weekly accounts of descriptive events, and the researcher's reflection as events unfold (Eisenhardt, 2002). To reduce the researcher's personal biases and prejudices, the researcher's observation and reflections were compared with the facilitators' reflective journals. This technique of overlapping qualitative data collection assists in data triangulation (Eisenhardt, 2002). Content analysis refers to the technique of decoding meaning from communication text (Dabbagh & Bannan-Ritland, 2005). Although content analysis of conference transcripts is able to detect any change in participants' attitude during participation in the module, independent collaboration of data is needed to determine if attitudinal changes result in any subsequent behavioural changes. The workplace survey (Level 3) completed by the supervisor triangulate the data obtained at Level 2. A 3-month post module survey was also included in the Level 4 result data to establish any learning outcomes and sustained impact from the modules. This was needed as any subsequent behavioural changes are also dependent on many other variables at the workplace (Bramley, 1991).

3.3.2 Data analysis

While quantitative data provides a summarised and condensed form of data, qualitative data enhances the data by demonstrating the links between complex and large amount of data. The key feature of qualitative data is its meaningfulness (Gibbs, 2002). Data from the survey was analysed using SPSS for MS Windows Version 13.0. All statistics including means,

frequencies, percentages, and standard deviations were generated, with some additional statistics including t-scores and chi-squares also conducted.

Coding qualitative data provides a framework for subsequent data analysis, enabling data triangulation, data interpretation and conclusions to be drawn (Patton, 2002). Coding, "the process of identifying patterns and meaning in data", is one of the methods of data analysis in action research and is commonly used in analysing interviews, reflective journals and conference transcripts (Mills, 2003).

The unit of analysis in coding of transcripts can vary from a single word, sentence, paragraph or message to a theme (Rourke, Anderson, Garrison, & Archer, 2001; Schellens & Valcke, 2004). In the study, the researcher has adopted Henri's thematic unit of analysis (Rourke et al., 2001; Schellens & Valcke, 2004).

The main reason for choosing the theme as the unit of analysis is that it provides the researcher with the flexibility of coding. Henri's thematic unit refers to counting each "unit of meaning", by extracting the meaning from the text, without the constraint of word, sentence or paragraph limitation (Herrington & Oliver, 1999). While standardising the unit of analysis allows for easy and consistent identification, such classification is arbitrary and artificial (Rourke, Anderson, Garrison, & Archer, 1999). Since the length of the unit of meaning is dependant on the writing style of the participants. Ideas or messages could either be conveyed by a single sentence or between 1-2 paragraphs with illustrations. To limit the unit of analysis to either a single sentence or paragraph would thus be inappropriate. In addition, as the postings essentially involved sharing participants' learning and reflections, explicit statements were the norm with subtle meanings a rarity. Thus, the issues of increased subjectivity and low coding reliability associated with coding for more subtle themes posed less of a problem here (Rourke et al., 2001).

Conceptual framework for coding criteria

Meaningful evaluation is only possible when there is good understanding and successful incorporation of appropriate pedagogy into evaluation strategies (Reeves, 1997). It follows therefore, that an appropriate conceptual model of the reflective process is needed to form the basis for the researcher's evaluation of participants' level of reflection and the reflection

outcomes. The aim of the conceptual model therefore is to inform and guide the researcher as to the criteria for analysing and evaluating the data (Breakwell & Millward, 1995).

Reflective models have been used extensively in teacher education training. For instance, Simmons et al.'s taxonomy was specifically designed for assessing reflective exchanges online in teacher's development (Hawkes & Romiszowski, 2001; Loughran, 2002). Boud et al.'s reflective model offers a generic model of reflective process that can be applied in the analysis of radiation therapy discussions in the present study (see Chapter 2, Section 2.4.1). The researcher has also compared Boud et al.'s model with Gunawardena et al.'s model of social construction of knowledge in computer-mediated communication. All five phases of Gunawardena et al.'s social construction model were identifiable in the Boud et al's reflective model. Based on Boud et al's reflective model and incorporating Gunawardena et al.'s social construction model on computer-mediated communication, seven levels of reflective process for coding were identified (see Table 3.2).

Table 3.2
Boud et al.'s reflective model: Elements and coding criteria

Level	Elements of reflective process	Criteria
0A	**Returning to experience**	Description of experience & events
0B	Sharing and exchanging of information	Initiating query
0C		Responding to query/posting
0D		Extending discussions
1	**Attending to feelings**	Being aware of one's feelings
1A	Positive feelings	Using positive experience to advance learning
1B	Negative feelings	Removing negative experience that impedes learning
2	**Association**	Relating of new data to pre-existing knowledge, feelings or attitudes Consideration of multiple perspectives
3	**Integration**	Synthesising old and new knowledge to establish new insight
4	**Validation**	Testing and verifying the proposed synthesis for consistency
5	**Appropriation**	Internalising the knowledge into one's own
6	**Outcomes of reflection**	Postings showing their understanding of knowledge or ways of thinking have changed as a result of the forum exchanges (G)
6A	Action	New way of doing things, development of new skills, commitment to action, readiness for application
6B	Affective	Changes in emotional state, attitudes
6C	Perspectives	Transformation in perspectives, clarification of an issue, changes in values

Note. Adapted from Boud et al. (1985, pp. 27-36); (G) Retrieved from Gunawardena, Lowe, & Anderson (1997, p. 414).

Reliability of content analysis coding

Systematic consistency and reliability are essential when using content analysis. Content analysis is the technique used by many researchers in the analysis of text-based asynchronous computer conferencing (Rourke et al., 2001).

Choosing the appropriate conceptual framework to analyse transcripts is essential in ensuring systematic consistency in content analysis (Rourke et al., 2001). Given that the aim of content analysis in this study is to identify participants' reflective outcomes, the use of Boud et al.'s model of reflective process as the conceptual framework to analyse reflection postings is appropriate. To further minimise researcher's bias, particular emphasis was directed at how these different levels of reflective process were applied in the context of the pilot modules' reflections postings. Any postings that were difficult to code were discussed with the supervisor.

In the study, the reliability of the coding process started with the researcher coder stability and ended with inter-rater reliability (between the researcher and supervisor). Coder stability is defined as "one coder agreeing with herself over time" (Rourke et al., 2001, p6). Thus to maintain coder stability, the researcher completed the coding within a 5-day period with minimal disruption. This approach has the effect of reducing idiosyncratic differences committed by the researcher, which would otherwise increase if coding was done over a longer duration.

Inter-rater reliability refers to "the extent to which different coders, each coding the same content, come to the same coding decisions" (Rourke et al., 2001, p5). Thus, to ensure inter-rater reliability, the supervisor independently coded two sets of reflection postings, one from each pilot module. Attention was focused on the correct application of concept and definition of reflective process rather than on the agreement of starting and ending of the code, since the latter is often arbitrary and thus not a good measure of reliability (Gibbs, 2002).

Some of the validity threats to qualitative data analysis include inconsistent coding and overemphasis on positive cases. The use of computer software for qualitative data analysis allows for easy coding and retrieval of text, thereby assisting researcher in the handling and analysis of data (Gibbs, 2002; Patton, 2002). Such software helps ensure consistency in coding and allows repetitive checking to detect negative cases (Gibbs, 2002). Hence, to

increase validity, conference transcripts from both 1st and 2nd pilot module were analysed with the assistance of a computer software package. Further the large amount of postings made manual handling of data a difficult task and subjected the coding and analysis to increased validity error (Wiersma & Jurds, 2005).

Conference transcripts were coded and analysed using a qualitative software package, NVivo. NVivo was chosen because the software caters specifically to finer detailed analysis for smaller studies, as is the present study. NUD•IST (Non-numerical Unstructured Data Indexing, Searching and Theorising), another common qualitative software is more suited for large-scale projects with a "broad-brush" approach (Gibbs, 2002, p. xxiii). One common criticism of such computer software packages is that researcher often feels distant from the data due to the inability of the program to view the coded message in context. Current NVivo software eliminates this shortfall (Gibbs, 2002). In addition, the minimum text for NUD•IST coding is a paragraph while the minimum coding text for NVivo is a single word to a paragraph (Gibbs, 2002). NVivo therefore provided greater flexibility in coding which was more suited to the thematic unit of analysis adopted in the present study.

In the present study, open-ended comments in the CPD Survey, interviews and reflective journals were coded manually. This approach was possible due to the limited amount of data and minimal number of interviews involved. Data were analysed by grouping the responses according to the themes of the study (Wiersma & Jurds, 2005), namely MRS attributes, future of the MRS profession, CPD and research in the MRS profession. When analysing the open-ended comments and reflective journals, a bottom-up or data driven approach was used. Notes and comments were noted along the margins and were regularly reviewed to ensure consistency in the coding process (Wiersma & Jurds, 2005).

3.3.3 Reliability, validity and generalisability of data in action research

The concepts of reliability, validity and generalisability require different definitions when applied in the context of action research (Costello, 2003). This is because these terms originate in quantitative research where these concepts are specifically applied in the fields of numerical data (Costello, 2003; Mills, 2003).

In quantitative research, external reliability refers to “the extent to which the research is replicable” (Wiersma & Jurds, 2005, p. 491). However, the distinctive feature of action research, which emphasises the local context of the study field, makes replication of the study in other fields difficult. Nevertheless, some educational researchers maintain that it is nevertheless possible to enhance the external reliability of action research by ensuring the study is conducted in a systematic fashion (Wiersma & Jurds, 2005).

Internal reliability refers to “the consistency of the research process” (Wiersma & Jurds, 2005, p. 215). In qualitative research, internal reliability is achieved as long as the results from different observers point towards the same conclusion (Wiersma & Jurds, 2005). Thus, using multiple observers in data collection is an appropriate strategy. In the present study, internal reliability was achieved by using multiple observers to triangulate the data, namely the researcher, facilitators, participants of the online module and workplace supervisors of online participants.

Validity in quantitative research refers to “the extent to which a measurement instrument measures what it is supposed to measure” (Wiersma & Jurds, 2005, p. 492). In action research, validity refers to the accuracy of claims based on the findings of the study (Schwalbach, 2003), and validity is achieved when consensus is achieved amongst stakeholders participating in the action research (Holly, Arhar, & Kasten, 2005; Rossi & Freeman, 1993). This is because action research is more concerned with finding an appropriate solution for a group of stakeholders as opposed to the ‘best’ or ‘correct’ answer in all situations (Stringer, 1996 as cited in Holly et al., 2005). If the findings are contradictory, than it highlights the need for further analysis and research (Trend, 1978).

By triangulating both the qualitative and quantitative approaches, the overall validity of the study can be increased (Bryman, 1992; Cohen & Manion, 1980; Patton, 2002). A number of strategies can collectively reduce the threats to the validity of a study. For the present study, these included adopting a systematic approach to the action research, triangulating the data to reduce researcher’s personal bias and prolonged involvement of the researcher to reduce participants’ bias in the study.

To increase the validity of the study, it was conducted in a systematic manner with descriptive validity (Robson, 2002; Schwalbach, 2003). Descriptive validity refers to the “factual

accuracy" of the account (Maxwell, 2002, p. 45). In the study, descriptive validity was maintained in two ways. First, interviews were transcribed, thereby eliminating the possibility of inaccuracy due to faulty recollection or misinterpretation on the part of the researcher. Second, participants' discussions from online discussion forums were stored in the computer-mediated communication software and any excerpts used were reproduced in their entirety. In addition, the researcher adopted a statistically descriptive data approach by counting the number of times a certain type of reflective activity took place at the discussion forum. It is common to adopt a combination of frequency counts with qualitative analysis (Gherardi & Turner, 2002; Maxwell, 2002).

One way of reducing the researcher's personal bias is to triangulate the data with multiple data sources and collection strategies (Mills, 2003; Robson, 2002; Rossi & Freeman, 1993). These strategies included a workplace survey that was completed by the workplace supervisors, reflective journals of researchers and facilitators, participants' input in the form of survey feedback, participants' learning in the form of EBP assignments, participants' learning portfolio and participants' contributions in the discussion forum. Survey feedback was conducted throughout the module including a 3-month post module survey. As the online module ran for three months, the prolonged period of involvement of all stakeholders in the study also further reduced the threat to validity of the study (Robson, 2002).

One common criticism of action research in education is the ethical dilemma of conducting teaching and research simultaneously with learners (Salmon, 2002b). Participants of the online module were aware that the module formed part of the researcher's PhD study. This raised the possibility that participants' behaviour and responses in the online module may have been inadvertently influenced by the awareness that their responses in the discussion forum formed part of the data collection (Mcpherson & Nunes, 2004). In the present study, the researcher in assuming the role of the moderator took on two responsibilities, as an active member (moderator) of an online community of practice and as a researcher observing participants' learning as discussions unfolded. While the researcher's presence may have influenced participants' behaviour and responses, the researcher's involvement as the moderator may in turn have counteracted that influence and reduced participants' possibly biased responses (Robson, 2002). The prolonged presence and involvement of the researcher led to a trusting relationship developing between online participants and the researcher, which

had the effect of reducing the possibility of participants providing a biased response (Robson, 2002).

Generalisability refers to "the extent to which findings from a given study can be applied in other settings and populations" (Charles & Mertler, 2002, p. 381). Different opinions exist between education researchers as to the relevance of generalisability in action research, with some maintaining that action research is only applicable to a specific context and cannot be generalized to another field of study, and others maintaining that the usefulness of any research lies in its generalisablity (Mcpherson & Nunes, 2004; Mills, 2003; Wiersma & Jurds, 2005). A solution to this dilemma is for the action researcher to ensure that the action research is well documented so that readers can make their own judgement regarding the generalisability of the research (Wiersma & Jurds, 2005). It is the researcher's opinion that the CPD educational framework, with minor adaptations, can be applied across other healthcare professions, in particular, in other MRS disciplines.

3.4 First Research Phase: Data collection

Data collection from the MRS stakeholders was necessary in order to inform the researcher about the current and future needs of the MRS profession. Together with the literature on learning and teaching theories and the MRS literature, this data guided the researcher in the design of the CPD educational framework underpinning the MRS online module.

In the present study, data were gathered using four needs assessment approaches:

- survey: CPD Survey 2003 (see Section 3.4.1);
- key informant: interviews with HODs (see Section 3.4.2);
- community forum: Australian Institute Radiography Working Party Report 2004 (see Chapter 2, Section 2.3.2); and
- social indicators: secondary sources via MRS literature (see Chapter 2, Section 2.3) (Venable and Mott as cited in Birkenholz, 1999).

This section focuses on the data collection conducted in the First Research Phase, using the CPD survey and interviews with HODs.

3.4.1 Continuing Professional Development Survey 2003

A survey was used because it is an efficient way of collecting data from a targeted population at a relatively low cost (McMillan & Schumacher, 2006; Wiersma & Jurds, 2005). The survey represents a versatile way of collecting information that can be generalised across different subgroups in the MRS disciplines, namely radiography and radiation therapy (McMillan & Schumacher, 2006).

Aims of the CPD Survey

The CPD Survey aimed to collect information from MRS stakeholders, namely MRS practitioners and Heads of Clinical Departments on the following issues:

- attributes for current and future practice;
- level of professionalism of MRS practitioners as perceived by the respondents; and
- learning needs of MRS practitioners and CPD culture in the workplace.

Design of the CPD survey

The CPD Survey consisted of 39 items and was divided into three sections (see Appendix 3.1).

Section A of the CPD Survey aimed to establish the demographic details of the respondents. This information enabled the researcher to co-relate the survey data with respondents' background, providing additional insights into the data analysis.

Section B focused on the importance of attributes for current and future practice as perceived by the respondents. Respondents were asked to rate each of the attributes listed according to the level of importance for current and future practice, the latter being defined as a five-year period. The attributes were classified into five categories: professional, generic, leadership, attributes for CPD, and attributes for advancing workplace practices. In the context of the present study, instead of simply listing lifelong learning attributes as a separate category, the researcher has classified lifelong learning attributes as the attributes that assist practitioners in their CPD. This highlights the importance of lifelong learning attributes in practitioners' CPD (see Table 3.3).

Table 3.3

Attributes that assist MRS Practitioners in their performance of current and future duties

Categories	Attributes	Items on CPD Survey.
Professional (P)		
	Clinical competence	(b)
	Research competence	(h)
	Knowledge of discipline	(l)
Generic (G)		
	Computer literacy	(a)
	Multi-disciplinary teamwork	(d)
	Communication	(i)
	Adapting to situations of change	(m)
	Managing people and tasks	(p)
Leadership (L)		
	Leadership	(g)
Attributes for CPD		
Lifelong Learning (LLL)		
	Self-evaluation	(e)
	Self-management	(f)
	Self-directed learning	(n)
	Seeing the 'big-picture'	(q)
Attributes for advancing workplace practices		
Professional leadership (PL)		
	Initiating change	(j)
	Negotiation/political advocacy	(k)
	Risk-taking	(o)
	Research competence	(h)
Reflection (R)		
	Creativity and innovation	(c)
	Self-evaluation	(e)
	Self-management	(f)

Note: Attributes in italics refer to those attributes that can be classified in more than one category. For instance, although classified as lifelong learning attributes, self-evaluation and self-management are also attributes that are essential in order to enable practitioners to reflect on their work practices. Also, research competence is an important attribute that can advance workplace practices.

The researcher has also created a category of attributes that are essential in advancing workplace practices. Under this group, there are two clusters: 'Professional leadership' (PL) and 'Reflection' (R). Professional leadership refers to practitioners' ability to take the 'lead' in advancing workplace practices. The term 'professional' has been added not only to distinguish it from the traditional leadership attribute, but also to highlight the responsibility of being a member of the health profession; that it is every practitioner's responsibility to make suggestions and changes that will improve workplace practices. Attributes that relate to practitioners' ability to reflect, such as creativity and innovation, and self-evaluation, are classified under 'Reflection' (see Table 3.3).

Section B also sought to establish respondents' views on the issue of MRS professionalism and the future of the MRS profession. Specifically, respondents were asked to rank the level of professionalism, level of public regard for MRS practitioners and level of public knowledge of each profession listed. To obtain a comparative study of MRS practitioners with other healthcare professionals, respondents were also to rank each of the above tasks with other healthcare professionals. A total of ten health professions were listed. Aside from the four MRS disciplines (radiography, sonography, nuclear medicine and radiation therapy), two established health professions were also included, namely, doctors and nurses, in order to provide a reference for comparison. In addition, four other allied health professions were chosen to allow for comparison of MRS disciplines against these allied health disciplines (see Appendix 3.1, Section B: Q1).

Section C focused on CPD in the MRS workplace. It aimed to identify the learning needs of MRS practitioners, the type of CPD activities and the level of support provided by MRS employers for practitioners' CPD. As the study was about online learning, questions were also asked to determine practitioners preferred style of learning and their level of online experience and expertise.

To ensure clarity of the survey and to identify ambiguities, misunderstanding and redundant items (Borg & Gall, 1989; Converse & Presser, 1986; Jaeger, 1997; Wiersma & Jurds, 2005), the CPD Survey was first piloted amongst Heads of clinical departments and MRS academics in Victoria. A total of 13 surveys was sent with 10 returns, giving a 77% completion rate. Majority of feedback was directed on clarity of instructions and questions, including definition of terminology.

Survey distribution

The entire MRS community was targeted for the CPD survey as CPD affects all MRS practitioners. Respondents of the CPD survey thus included radiographers, radiation therapists as well as sonographers and nuclear medicine technologists who are also members of the Australian Institute of Radiography.

MRS practitioners were able to access the *CPD Survey* either via the web or as paper based. There were several reasons for making the survey web-based. This included matching the data collection technique to the focus of the study, which is online CPD programs, and the ease

and convenience of accessing and completing web-based survey. Given that the present study is about exploring online CPD delivery, it follows that there is a need to match "the inquiry topic to the data collection technique" (Watt, 1999, p. 40). Thus, a web-based survey would attract the sample population of MRS practitioners who were adept to web-based or online technology. Having the survey available via the web enabled the researcher to gauge this group of MRS practitioners' attitudes towards online learning. The *CPD Survey* was available electronically via the web: http://cpdsurveymrs.com (see Appendix 3.2). Announcements, with follow-up reminders, regarding the availability of the *CPD Survey* were made through several MRS professional websites and newsletters and via the Australian Institute of Radiography's electronic newsletter (see Table 3.4).

In addition, the convenience of a web-based survey assisted the researcher in the subsequent qualitative data gathering. There was efficient data transfer with minimum time lag between the respondents completing the survey and the researcher accessing the data as the technology directly captured the data onto the excel spreadsheet, eliminating the usual time needed for data entry (Wiersma & Jurds, 2005). In this instance, the speedy data collection enabled immediate interpretation of data and assisted the researcher in the preparation of the interviews with HODs. Moreover, putting the survey on the web is less time consuming and cheaper than the total cost associated with printing and provision of self-addressed envelope for national mailing (McMillan & Schumacher, 2006; Schillewaert, Langerak, & Duhamel, 1998; Watt, 1999).

However, the researcher was unable to rely fully on the web-based strategy, as the sample was limited to only those who had access to computer and the Internet (McMillan & Schumacher, 2006; Watt, 1999). This made generalisation of the survey findings impossible, thereby reducing the external validity of the results (Watt, 1999, p. 20). Thus, the paper-based *CPD Survey* was also made available to the MRS community in order to have a more representative sample of the MRS population and to increase the external validity.

Although there was no data to indicate the precise percentage of MRS practitioners who have access to the Internet, an indication of MRS practitioners' access to the Internet may be gauged from the number of practitioners registered on the Australian Institute of Radiography's electronic newsletter in 2003. As of 7th of March 2003, despite a membership of approximately 4000, only 296 MRS practitioners or 7.4% of members were registered on

the electronic newsletter (de Jong, email communication, March 7, 2003). It was therefore essential to disseminate paper copies of the CPD Survey in order to reach a more representative sample of the MRS population. Thus, the cost saving advantage of web-based survey was partly offset with the researcher adopting a limited form of paper mailing approach. By adopting the complementary approach of web-based and paper based, the researcher was aiming to reach a wider section of MRS community (Schillewaert et al., 1998, p. 6).

Given that MRS practitioners are known to respond poorly to survey, as evidenced by the previous studies and the national study on lifelong learning, with only 14.5% response rate (Sim, 2000), the researcher adopted a variety of distribution strategies for the dissemination of paper copies of the CPD Survey. These included sending letters (Appendix 3.3) to the Heads of Radiology and Radiotherapy Departments of major hospitals and clinical centres throughout Australia and seeking their assistance in getting their staff to complete the survey. Due to time and financial constraints, depending on the size of the centres, only five to ten copies of the *CPD Survey* were sent with request for the Department to photocopy the required number. Similar requests were also sent to Chairpersons of all six branches of Australian Institute of Radiography and convenors of MRS seminars and workshops, requesting for the survey to be distributed during branch meetings, seminars and workshops. In addition, as the researcher was invited by clinical educators of a major radiation therapy centre in Victoria to give several presentations on lifelong learning and CPD, copies of the Survey were distributed during those presentations. Table 3.4 provides a summary of the dissemination strategies adopted in the study.

As the survey was to be hosted on the web, attention was given to the design of the survey to filter ‘professional surfers’ from the genuine MRS practitioners in order to prevent data contamination. The web-based survey therefore included two additional questions to assist the researcher in isolating respondents who were not MRS practitioners (see Appendix 3.2, Section A: Q11 & Q12). The two questions sought information regarding respondents’ initial MRS qualification. Unlike nursing education, which is provided by the majority of Australian universities, MRS undergraduate education is currently offered by only eight Australian universities. Prior to the introduction of the degree qualification in the late 1980s and early 1990s, only a few additional colleges and Tafe institutions provided the diploma and certificate training. Practitioners working in Australia who claimed they had overseas

qualifications were required to indicate the name of the Australian professional group that assessed their overseas qualifications. Given the low profile of the MRS profession, such information was only known within the MRS community and were thus considered to be appropriate screening questions.

Table 3.4
Dissemination strategies for CPD Survey

Dissemination strategy	Publicity via MRS professional associations/Clinical centres	Appendix
Website	• the Australian Institute of Radiography website • the Centre of Magnetic Resonance website •	3.4 3.5
Electronic discussion list	• the Australian Institute of Radiography's electronic discussion list	3.6
Newsletter	• the Australian Institute of Radiography's newsletter, *Spectrum* • the Australasian Sonographer Association's newsletter, *Sound Effects* • the Australian and New Zealand Society of Nuclear Medicine newsletter	3.7 - -
Major hospitals & clinical centres	• letters to Heads of Clinical Departments (Radiology & Radiation therapy Centres)	3.3
State branch meetings	• the Australian Institute of Radiography state branches: Tasmania, Victoria, New South Wales, South Australia, Queensland and Western Australia	-
Seminars & workshops	• seminars & workshops conducted in Australia by the Australian Institute of Radiography (nine out of 10 conveners took part in the CPD Survey distribution)	-
Presentations	• major radiation therapy centre in Victoria: presented at four branches •	-

As the hard copy would be distributed only within the MRS professional community, namely via hospitals, clinical centres and through MRS seminars and branch meetings, the two screening questions were redundant and therefore deleted from the paper version.

3.4.2 Interviews

Semi-structured interviews were conducted with the HODs three months after the survey to enable the researcher to explore the survey data at a deeper level. Issues explored in the interviews included seeking interviewees' views on the importance of attributes for current and future practice, the future of the profession, CPD in MRS workplace, and research in MRS (see Appendix 3.8). Although interviewing was time consuming and labour intensive, it provided the opportunity for the researcher to seek a deeper understanding and clarification of issues that were raised in the survey (McMillan & Schumacher, 2006; Wiersma & Jurds, 2005). Eight interviews were judged to be sufficient for this purpose. Moreover, interview, as a data gathering technique, is especially useful to solicit in-depth responses in emotive issues (Best & Kahn, 2003). Topics such as role extension and the future of the MRS profession are emotive issues for some members of the profession.

A random sample of eight Heads of clinical departments was invited to participate in the interviews. All eight consented to participating in the interview. To ensure a wide variety of views were canvassed, the Heads of clinical departments were randomly selected from various radiography and radiation therapy disciplines, representing public and private sectors as well as metropolitan and regional areas (see Table 3.5).

Table 3.5
Backgrounds of Heads of clinical departments interviewed

Sector	State	Hospital	Discipline of HODs	Interview date
Public	Tasmania	Regional	Radiography	15/07/2003
Private	South Australia	Regional	Radiography/Sonography	16/07/2003
Private	South Australia	Metropolitan	Radiation therapy	22/07/2003
Public	Queensland	Metropolitan	Radiography	28/07/2003
Public	Western Australia	Regional	Radiography/Sonography	30/07/2003
Private	Victoria	Metropolitan	Sonography	31/07/2003
Public	Victoria	Metropolitan	Radiation therapy	05/08/2003
Public	Western Australia	Metropolitan	Radiography	07/08/2003

Interviews were conducted using a combination of structured and semi-structured questions. Structured questions were used to allow the researcher to quantify some aspects of responses while semi-structured questions were used to solicit individual responses and yet keeping the topics discussed focused (McMillan & Schumacher, 2006). This two-prong approach provided a high degree of objectivity and uniformity, thereby increasing validity, and yet allowed the researcher the flexibility to probe and seek clarification from interviewee's responses (Best & Kahn, 2003; McMillan & Schumacher, 2006). The adoption of semi-structured interview also increased the intrarater reliability. Intrarater reliability refers to the extent to which an interviewer is consistent when there are more than two interviews (Wiersma & Jurds, 2005). Reducing researcher's bias increases the interview validity (Best & Kahn, 2003; Cohen & Manion, 1980). This was achieved by audio recording the entire interview, thereby reducing the possibility of the researcher subconsciously selecting only those comments that underline her prejudice (Borg & Gall, 1989). In reporting the data, whenever possible, quotations were used to avoid misrepresenting the interviewees' responses.

The data collected in the First Research Phase, its analysis and interpretations are presented in Chapter 4. This data assisted the researcher in refining the research questions and in the development of the educational framework for CPD for MRS practitioners.

Chapter 4

First Research Phase: Data analysis and reflection

4.1 Demographics of the CPD Survey

4.2 Research Question 2: **Attributes of Medical Radiation Science practitioners**
According to practitioners and Heads of clinical Departments (HODs), what are the attributes required by practitioners to address the future needs of the MRS profession?

4.2.1 (a) What are the key attributes that assist practitioners in the performance of their current duties?

4.2.2 (b) What are the key attributes that will assist practitioners in the performance of their future duties?

4.2.3 (c) What, if any, are the differences in responses between practitioners and HODs?

4.3 Research Question 3: Professionalism
What are MRS personal perceptions of themselves as professionals?

4.3.1 (a) What are practitioners' and HODs' perceptions of the MRS profession in relation to other health professions?

4.3.2 (b) How, if at all, do perceptions differ between practitioners and HODs?

4.3.3 (c) Does the level of perceptions of MRS professionalism impact on MRS practitioners' ability to deliver the best possible health care for our patients?

4.4 Research Question 4: Workplace culture

4.4.1 In terms of workplace culture, what are the factors that influence MRS practitioners' decisions to engage in CPD?

4.5 Action Research Cycle 1: Refine Research Question 1

4.5.1 Analysis, synthesis and reflection of data

4.5.2 Refine Research Question 1

4.6 First Research Phase: Conclusion

4.6.1 Summary of Action Research Cycle 1 findings

4.6.2 Overview of research questions and source of data

In this chapter, the data analysis and reflection on the data collected from the CPD Survey and interviews with HODs are presented to address Research Questions 2, 3 and 4. Answers to these questions enabled the researcher to further refine Research Question 1. In addition, the answers also guided the researcher in the design of the CPD educational framework and the implementation of the online module. Data collected from the online module addressed Research Question 1 (see Chapter 6). Chapter 4 concludes with a summary of the findings of the First Research Phase.

4.1 Demographics of the CPD Survey

There are approximately 8000 radiographers and radiation therapists practising in Australia (George, 2004; Guest, 2005b). A total of 450 completed surveys were received. However, it is impossible to state precisely the response rate since the sampling frame was unavailable and because of the dissemination strategies adopted by the researcher. The strategies included putting the survey on the web and distributing copies of the CPD Survey to the MRS professional community with request to duplicate as many copies as required (See Chapter 3, Section 3.4).

18.2% of the 450 returns were web-based with the majority 81.8% being paper-based (see Figure 4.1). 65% of the respondents were aware of the survey through their colleagues, indicating that as far as the MRS community is concerned, the personal approach strategy of obtaining respondents worked in this situation.

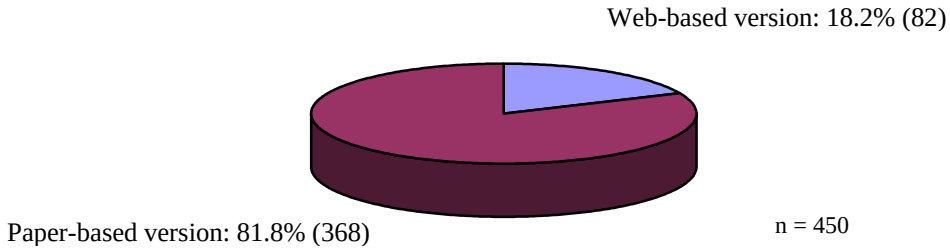

Figure 4.1
CPD Survey: Percentage of paper and web-based responses

Given that the Australian Institute of Radiography represents 53% of MRS practitioners in Australia, its membership profile was used as comparison with the sample population in the present study (George, 2004). Two-thirds of the respondents (67.1%) were female, with female respondents outnumbering male respondents by 2 to 1. This gender distribution is compatible with the Australian Institute of Radiography's female representation of 65.2% (Guest, 2005b).

Forty percent of the respondents were in their 20s compared to 24% in the Australian Institute of Radiography (Guest, 2005b)(see Figure 4.2). Given that MRS degree programs only started in the late 1980s and early 1990s, the larger younger age group of respondents explains why

48% of the respondents in the present study have degree qualification (see Figure 4.3), compared to 30% of degree qualified in the 2000 lifelong learning study (Ryan, 1998; Sim, 2000).

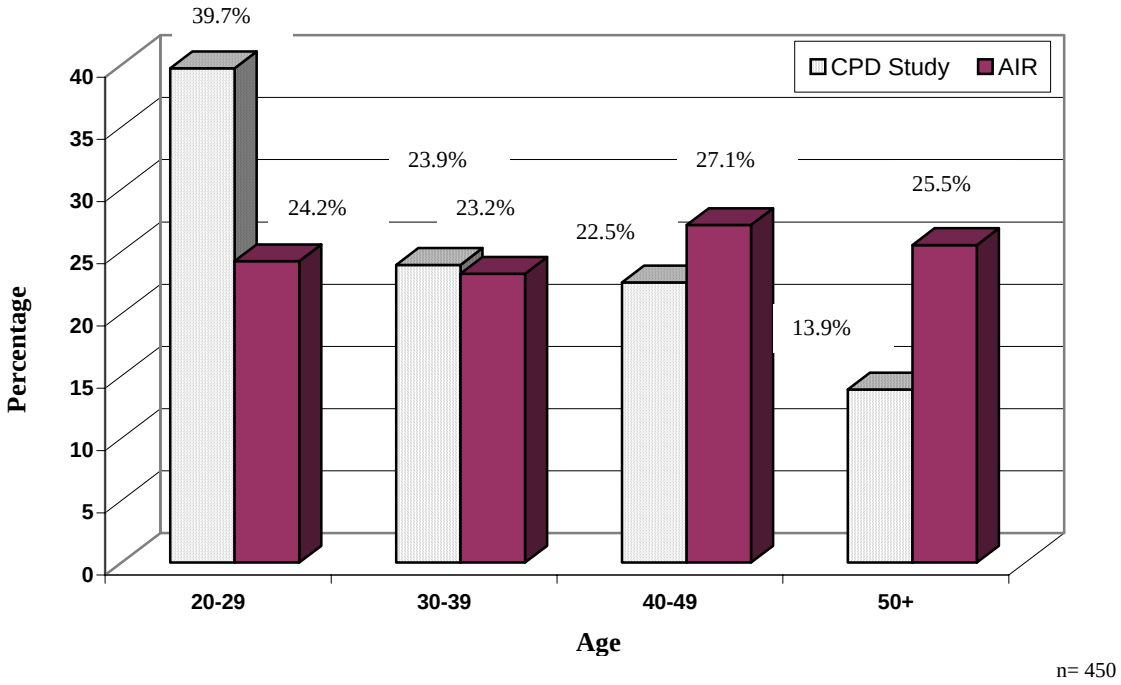

Figure 4.2
Age distribution in the CPD Survey, matched against Australian Institute of Radiography (AIR) members

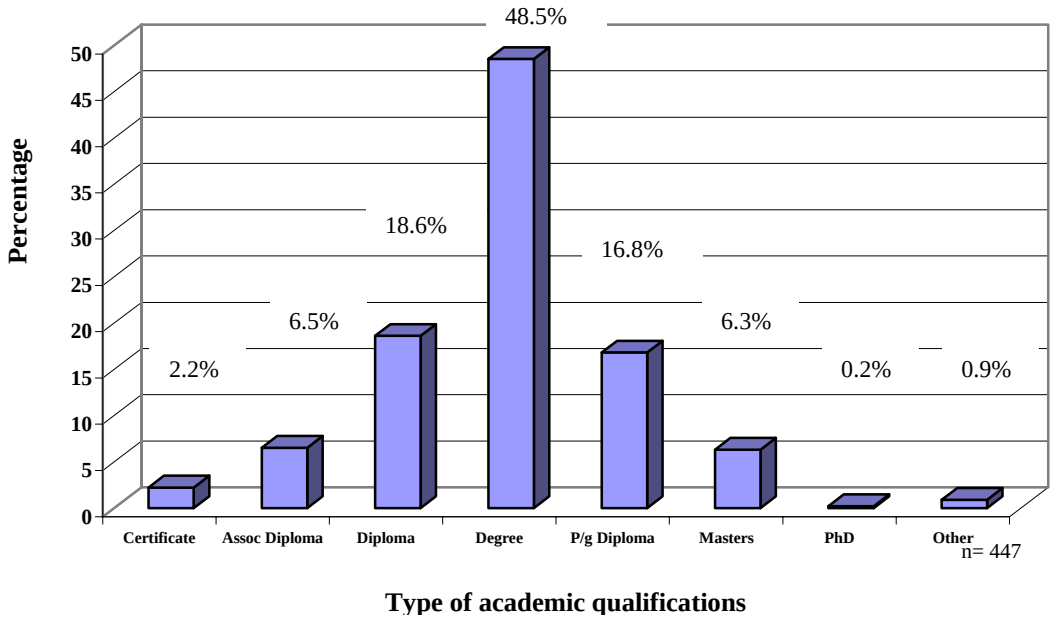

Figure 4.3
Highest academic qualification obtained by respondents in the CPD Survey

Radiographers and radiation therapists formed the two largest groups of respondents, 54.5 % and 30.4% respectively, with sonographers and nuclear medicine technologists accounting for only 6.7% and 1.6% of the cohort respectively (see Figure 4.4). These responses reflected the statistical profile of the Australian Institute of Radiography membership. As the study was directed at radiography and radiation therapy communities, the low response rate from sonographers and nuclear medicine technologists was expected. 'Other' category refers to MRS practitioners who have either retired or left the MRS profession to pursue different careers. Responses from the radiation therapy (30.4%) were much higher than the 18.8% of radiation therapy population, perhaps reflecting the greater enthusiasm among the radiation therapy community as evidenced from interview findings, successful representation of radiation therapy at the Federal level, and the recent success of the radiation therapy community to secure CPD funding from the Federal government (Guest, 2005b; Hamilton, 2005b; Smylie, 2003).

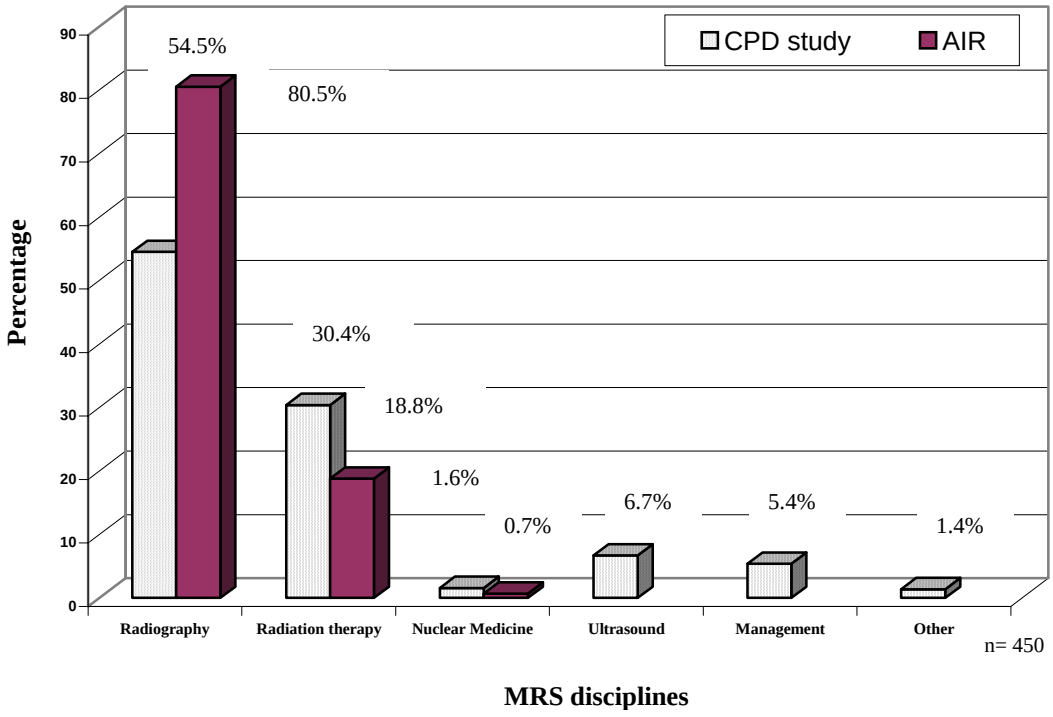

Figure 4.4
Distribution of practitioners via MRS disciplines in the CPD Survey, matched against Australian Institute of Radiography (AIR) members
Note: Radiography statistics for AIR includes both radiographers and sonographers

All eight HODs invited to participate in the interview agreed resulting in a 100% response rate. Reflecting the higher percentage of females in the general MRS practitioner population, 80% of the interviewees were female. 37.5% and 62.5% of the interviewees worked in the private and public sector, respectively. Of the eight HODs interviewed, 25% were from radiation therapy with the rest being from radiography and ultrasound.

4.2 Research Question 2

According to practitioners and Heads of clinical Departments (HODs), what are the attributes required by practitioners to address the future needs of the MRS profession?

Research Question 2 aims to determine the attributes that are considered essential, by MRS practitioners and HODs, in addressing the future needs of the profession. To answer Research Question 2, it is further divided into 3 sub-questions, focusing on how the MRS practitioners and HODs ranked the importance of attributes in current and future practices, and determining if these two groups of stakeholders differed in their manner of ranking.

Method of ranking

To determine which of the attributes were considered essential, respondents were asked to rank the 17 attributes listed in the CPD Survey in order of importance. As shown in Table 3.1 (Chapter 3, Section 3.4.1), the 17 attributes were classified into the following categories: professional, generic, leadership, lifelong learning, professional leadership and reflection. To facilitate easy reading, Table 3.1 is repeated here as Table 4.1.

Respondents were asked to rate each attribute on a scale from 1 (Very Unimportant) to 5 (Very Important). First, they were to rate each attribute in terms of its importance for *current* practice and then to rate the same attribute, in terms of its importance for *future* practice, in a 5-year time frame (see Appendix 3.1, Section B: Q1). Respondents who considered an attribute as ‘important’ or ‘very important’ had their responses combined into a single ‘important’ category. The attributes were then ranked according to the percentage of respondents who selected this newly combined ‘important’ category.

Table 4.1

Attributes that assist MRS Practitioners in their performance of current and future duties

Professional (P)	Generic (G)	Leadership (L)
Clinical competence	Computer literacy	Leadership
Research competence	Multi-disciplinary teamwork	
Knowledge of discipline	Communication	
	Adapting to situations of change	
	Managing people and tasks	
Attributes for CPD		
Lifelong Learning (LLL)		
	Self-evaluation	
	Self-management	
	Self-directed learning	
	Seeing the 'big-picture'	
Attributes for advancing workplace practices		
Professional leadership (PL)		
	Initiating change	
	Negotiation/political advocacy	
	Risk-taking	
	Research competence	
Reflection (R)		
	Creativity and innovation	
	Self-evaluation	
	Self-management	

4.2.1 Research Question 2a: What are the key attributes that assist practitioners in the performance of their current roles?

In order to gain a global picture of the manner in which the attributes were ranked, two approaches on the interpretation of the rankings were used.

First, the ranking list was divided into three clusters; the first cluster listing the top 1-5 rankings, the second cluster, listing the 6 to 10 rankings, and the third cluster listing the 11-17 rankings. Second, the attributes were viewed in terms of their classification as defined in Table 4.1. Adopting these two approaches enabled a better understanding of the relationship between the type of attributes and their impact on current and future practices, and hence the way in which respondents perceived these attributes. Interview data were used to triangulate the survey findings.

Table 4.2 shows the importance of attributes for current practice as ranked by both MRS practitioners and HODs. Although there were slight differences, between MRS practitioners

and HODs, in terms of where each attribute was located along the ranking list, these differences did not change the distribution of attributes into the three clusters (see Table 4.3).

Table 4.2
Importance of attributes for current practice as ranked by MRS practitioners and HODs

	MRS practitioners (n=356)				**HODs** (n=60)			
	Attributes	**%**	**Rank**		**Attributes**	**%**	**Rank**	
P	Clinical competence	94.6	1	P	Clinical competence	96.7	1	1st cluster
G	Communication	87.6	2	G	Communication	95.0	2	
G	Multi-disciplinary teamwork	78.0	3	P	Knowledge of discipline	90.0	3	
P	Knowledge of discipline	75.8	4	LLL	Adapting to situations of change	85.0	4	
LLL	Adapting to situations of change	73.0	5	G	Multi-disciplinary teamwork	81.7	5	
G	Computer literacy	61.8	6	G	Managing people and tasks	75.0	6	2nd cluster
LLL	Self management	59.2	7	LLL	Self management	73.3	7	
LLL	Seeing the "big picture"	58.6	8	LLL	Seeing the "big picture"	68.3	8	
LLL	Self-evaluation	56.2	9	G	Computer literacy	66.7	9	
G	Managing people and tasks	56.1	10	LLL	Self-evaluation	65.0	10	
L	Leadership	55.9	11	L	Leadership	61.7	11	3rd cluster
LLL	Self-directed learning	55.4	12	PL	Initiating change	61.7	11	
R	Creativity and innovation	51.3	13	LLL	Self-directed learning	61.7	11	
PL	Initiating change	51.0	14	PL	Negotiation/political advocacy	51.7	14	
PL	Negotiation/political advocacy	36.3	15	R	Creativity and innovation	48.3	15	
P	Research competence	24.8	16	PL	Risk-taking	22.4	16	
PL	Risk-taking	15.4	17	P	Research competence	18.3	17	

Note: Key to attribute classification: P = Professional, G = generic, LLL = lifelong learning, R = reflection, L = leadership, PL = professional leadership.

Table 4.3
Categories of attributes for current practice as ranked by both MRS practitioners and HODs

Cluster ranking	**Respondents**	**Attributes**							**Implications**
		P	**G**	**LLL**	**PL**	**R**	**L**		
1st (1-5)	Practitioners	2	2	1	-	-	-	Professional & generic	Essential for current job performance
	HODs	2	2	1	-	-	-		
2nd (6–0)	Practitioners	-	2	3	-	-	-	Generic & lifelong learning	Essential for continuing learning
	HODs	-	2	3	-	-	-		
3rd (11-17)	Practitioners	1	-	1	3	1	1	Professional leadership & others	Essential for advancing workplace practice
	HODs	1	-	1	3	1	1		

Note: Key to attributes: P = Professional, G = generic, LLL = lifelong learning, R = reflection, L = leadership, PL = professional leadership.

In examining the importance of attributes for current and future practice, it is appropriate to compare the present study with Sim's study (2000) on lifelong learning in MRS. This comparison will highlight changes, if any, in terms of MRS stakeholders' view on the importance of attributes for MRS practice.

As expected, the professional and generic attributes that are essential for current job performance were ranked as most important. Specifically, in the first cluster were clinical competence, communication, multi-disciplinary teamwork, knowledge of discipline and adapting to situations of change; all of which are essential for performance of current duties (see Table 4.2). This manner of ranking is consistent with current literature whereby clinical competence is an expected element of any healthcare profession (Ghaye & Lillyman, 2000; Sim, 2000).

The second cluster reflected an appreciation by both groups of respondents of the need to continue learning. This is because all attributes that appeared here, such as self-management, seeing the big picture, self-evaluation and computer literacy, had to do with continuing learning (see Table 4.2). The generic attribute managing people and task, although more related to the workplace, also has an impact upon one's ability to have more 'free time' for the pursuit of learning activities.

The third cluster of attributes included the following (see Table 4.2):

- Self-directed learning: this was the last of the five lifelong learning attributes listed to be included in the 3rd cluster. The low importance attached to self-directed learning reflects respondents' perceptions and the priority they placed on being independent learners. The other four lifelong learning attributes were ranked in the 2nd cluster, with adapting to change in the 1st cluster of attributes.
- Leadership: this attribute was not highly valued by MRS stakeholders in the 2000 lifelong learning study (Sim, 2000). Certainly ability to lead is not perceived as necessary in the MRS workplace where most of the work is protocol driven and when MRS practitioners work under the supervision of radiologists or oncologists.
- Creativity and innovation: the need to be creative and innovative was not viewed as an important attribute in a protocol driven workplace culture. Hence, its relegation to the bottom of the list. However, this attribute is essential for reflective practice (Distad &

Brownstein, 2004) and its low ranking brings into question practitioners' ability to reflect on their workplace practice.

- Research competence: this attribute was allocated last and second last on the list by both HODs and practitioners respectively. This finding confirmed the 2000 lifelong learning study. That study showed there was a lack of support in the workplace for research as employers regarded research as an expensive venture, preferring to focus their resources at assisting practitioners to upgrade their clinical skills. There were therefore no incentives for MRS practitioners to engage in research, as the latter does not advance their career progression (Sim, 2000).
- Professional leadership attributes included initiating change, risk taking and negotiation/ political advocacy. These are the attributes that assist practitioners in the advancement of their workplace practices. In order to advance workplace practices, practitioners need to be willing and able to initiate change. In addition, a certain element of risk taking is required, as practitioners would be required to break away from the conforming culture in the workplace. They must be prepared to risk that their suggestion(s) might be rejected or even ridiculed by their superiors and/or peers. At a personal level, an awareness of the importance of 'negotiation and political advocacy' would go towards removing some possible obstacles in the implementation of their ideas. However, taken at a more global level, in a constantly changing and increasingly competitive environment, an awareness of the importance of political advocacy would also allow the MRS leadership to gain the support of the practitioners' cohort in moving the profession forward.

Interviews with HODs did not reveal different attributes for current practice. Classifying the attributes under the category listed in Table 4.1, the attributes most commonly cited for current practice by HODs interviewed included:

- Professional attributes such as good patient care, excellent professional ethics;
- Generic attributes such as communication skills including excellent team work, good organization skills, ability to work under stress and problem solve, computer literacy;
- Lifelong learning attributes: willingness to learn, adapting to situations of change, critical thinking;
- Reflection: creativity in terms of lateral thinking; and
- Professional leadership: willingness to promote improvement in work place practices. This attribute was only mentioned by one HOD as an important attribute for current

practice [HOD7]. Two other HODs spoke of the need to advance workplace practices under the section of CPD, as one of the desired outcomes of CPD activities. The fact that only one out of eight HODs interviewed mentioned advancing workplace as an important attribute, echoed the CPD Survey findings that attributes such as initiating change were not high on the importance ranking of HODs.

In summary, both practitioners and HODs ranked the categories of attributes for current practice in a similar way (see Table 3.5):

- 1st cluster: ranked as most important attributes are attributes relating to job performance (professional and generic);
- 2nd cluster: attributes relating to continuing learning (generic and lifelong learning); and
- 3rd cluster: ranked as least important are attributes for advancing workplace practices (professional leadership).

These findings echoed the researcher's study on lifelong learning (Sim, 2000). Findings from that study indicated that the majority of MRS practitioners and HODs viewed professional and generic attributes that are related to clinical competency as the most important attributes, with lifelong learning attributes as the least important. The addition of the category of professional leadership attributes, which refers to MRS practitioners' ability to take the 'lead' in initiating and advancing workplace practices, has added another dimension of understanding to the way both MRS practitioners and HODs regarded MRS practitioners' role. Specifically, initiating and advancing workplace practice was not high on the agenda of majority of MRS respondents.

4.2.2 Research Question 2b: What are the key attributes that will assist practitioners in the performance of their future roles?

In considering future roles, computer literacy moved up to the 1st cluster, from the 2nd cluster in the current practice ranking, replacing knowledge of discipline and multi-disciplinary teamwork, in MRS practitioners and HODs' rating respectively (see Table 4.4). This reflects the acknowledgment by both groups that computer literacy is expected to gain increasing importance in five years' time. Aside from computer literacy moving up to the 1st cluster, there were no other changes envisaged in the clusters of importance of attributes over the next five years.

Table 4.4
Importance of attributes for future practice as ranked by MRS practitioners and HODs

	MRS practitioners (n=356)				**HODs** (n=60)			
	Attributes	**%**	**Rank**		**Attributes**	**%**	**Rank**	
P	Clinical competence	94.8	1	P	Clinical competence	98.3	1.5	1st cluster
G	Computer literacy	93.4	2	LLL	Adapting to situations of change	98.3	1.5	
G	Communication	90.8	3	G	Communication	95.0	3	
LLL	Adapting to situations of change	88.5	4	G	Computer literacy	93.3	4	
G	Multi-disciplinary teamwork	86.0	5	P	Knowledge of discipline	90.0	5	
P	Knowledge of discipline	78.6	6	LLL	Self-directed learning	88.3	6	2nd cluster
LLL	Self-directed learning	73.2	7	G	Multi-disciplinary teamwork	86.7	8	
LLL	Seeing the "big picture"	70.3	8	LLL	Seeing the "big picture"	86.7	8	
G	Managing people and tasks	70.2	9	LLL	Self management	86.7	8	
LLL	Self management	69.6	10	G	Managing people and tasks	80.0	10	
PL	Initiating change	67.1	11	LLL	Self-evaluation	78.3	11	3rd cluster
LLL	Self-evaluation	66.7	12	PL	Initiating change	76.7	12	
L	Leadership	63.2	13	L	Leadership	75.0	13	
R	Creativity and innovation	57.1	14	PL	Negotiation/political advocacy	73.3	14	
PL	Negotiation/political advocacy	51.6	15	R	Creativity and innovation	60.0	15	
P	Research competence	47.3	16	P	Research competence	46.7	16	
PL	Risk-taking	20.1	17	PL	Risk-taking	29.3	17	

Note: Key to attribute classification: P = Professional, G = generic, LLL = lifelong learning, R = reflection, L = leadership, PL = professional leadership.

Table 4.5
Categories of attributes for future practice as ranked by both MRS practitioners and HODs

Cluster ranking	**Respondents**	**Attributes**							**Implications**
		P	**G**	**LLL**	**PL**	**R**	**L**		
1st (1-5)	Practitioners	1	3	1	-	-	-	Predominantly generic	Essential for future job performance
	HODs	2	2	1	-	-	-	Professional & generic	
2nd (6-10)	Practitioners	1	1	3	-	-	-	Predominantly lifelong learning	Essential for continuing learning
	HODs	-	2	3	-	-	-	Generic & lifelong learning	
3rd (11-17)	Practitioners	1	-	1	3	1	1	Professional leadership & others	Essential for advancing workplace practice
	HODs	1	-	1	3	1	1	Professional leadership & others	

Note: Key to attribute classification: P = Professional, G = generic, LLL = lifelong learning, R = reflection, L = leadership, PL = professional leadership.

As a result of the shift in the importance of computer literacy, the ranking distribution altered slightly to accommodate this change (see Table 4.4). However, the implications for the categories of attributes ranking for future practice remained the same, with attributes relating

to clinical performance assuming the greatest importance, followed by continuing learning with the attributes relating to workplace advancement remaining at the bottom of the list (See Table 4.5).

All HODs interviewed were supportive of MRS practitioners assuming new roles and responsibilities. In terms of radiography, of the six imaging HODs, four were supportive of radiographers taking on limited film reporting while two preferring radiographers to create their own niche, such as assuming the role of radiation guardian, instead of attempting to carve their way into radiologists' turf. Radiation therapy chiefs were keen to have radiation therapists assuming increased responsibilities such as in the area of dosimetry, patient care and planning.

In response to the question as to what key attributes will assist MRS practitioners in the performance of new responsibilities in five years' time, the interview findings provided insight into HODs' view on the issue. HODs were unanimous that the key to practitioners assuming new roles is CPD. However, aside from citing the common attributes listed in the survey such as knowledge of disciplines, multi-disciplinary teamwork and ability to acquire the big picture, more than half of the HODs interviewed highlighted the importance of MRS practitioners having the appropriate attitude.

For instance, one HOD spoke of the importance of willingness to change and the motivation to move forward as being crucial to the development of individual practitioner and the MRS profession as a whole, as the following comment illustrates:

> A desire to move forward personally and as a profession as a whole, because if the motivation is not there, it is not going to happen. [HOD5]

Another stumbling block is the subservient attitude and low self-esteem of MRS practitioners, as the comment below illustrates:

> I don't know if they are attributes so much as attitudes? …RTs [radiation therapists] tend to be subservient…So there is an attitude that we are in a box, we must stay here because we shouldn't step out, it is a very hierarchical power ratio here. [HOD6]

> Radiographers don't have a high level of self-esteem. I think some of the younger ones probably think that they pretty important players. But it is the older ones that sort of say, "Well, don't try too hard, because you are only a radiographer". [HOD8]

The ability to reflect, to think critically and to adopt a bird's eye view when viewing problems were cited by another HOD as extremely important attributes for future practice, as illustrated by the following comment:

> So I think awareness, critical awareness, evaluation of the situation, being able to really de-construct and understand the underlining motivators and drivers behind what is happening, ability to reflect on what is going on, and not just to accept what is happening. So is questioning, and analyzing, and looking at the big picture, all of those things. [HOD6]

The survey data showed that there was no change in terms of the ranking of attributes for current and future practice. Specifically, attributes relating to clinical performance were ranked as the most important, followed by continuing learning with attributes relating to workplace advancement ranked as the least important. However, interview data supported MRS literature on the importance of attributes related to learning, particularly, MRS practitioners' ability to reflect. The data also emphasised the need to address the MRS practitioners' low self-esteem and subservient attitude, which were identified as prevalent amongst MRS practitioners.

4.2.3 Research Question 2c: What, if any, are the differences in responses between practitioners and HODs?

In order to determine if there were any differences in views between MRS practitioners and HODs for current and future practice, the statistical test of chi-square was conducted. In addition, for each of the attributes listed in the survey, addressing the differences in frequencies between current and future practice will enhance understanding of how responses between these two groups of stakeholders differed.

Chi-Square tests were conducted on the importance of attributes for *current* practice between MRS practitioners and HODs, with probability set at the 0.05 level. The statistical significance indicated that there was a difference between MRS and HODs on how they viewed the importance of the three attributes, namely negotiation/political advocacy,

knowledge of discipline, and managing people and tasks (see Appendix 4.1for values of Pearson Chi-Square for current attributes). A possible reason why these two groups of stakeholders viewed these attributes differently is that given the nature of HODs' responsibilities, HODs would perceive negotiation/political advocacy and managing people and tasks as important attributes for MRS practitioners. The HODs interviewed shared this view, indicating that MRS practitioners need to exercise negotiation and political advocacy skills if the profession is to 'break away' from the dominance of the medical profession [HOD1, HOD4, HOD7].

Chi-Square tests were also conducted on the importance of attributes for *future* practice between MRS practitioners and HODs, with probability set at the 0.05 level. Four attributes were found to be statistically significant: self-management, negotiation/political advocacy, self-directed learning and seeing the big picture (see Appendix 4.2 for values of Pearson Chi-Square for future attributes). These discrepancies in frequencies were due to the higher percentage of HODs, approximately 88% compared to 70% of MRS practitioners, ranking the attributes as very important. Apart from negotiation/political advocacy, all three other attributes are related to practitioners' ability to continue learning. This survey finding supports the emerging theme from interview data, highlighting the importance of attributes that are related to continuing learning for future practice.

For each attribute listed in the survey, a better understanding of the manner of ranking by MRS practitioners and HODs was obtained by determining the difference in frequencies between current and future practice. This was achieved by subtracting the 'very important' frequency distribution for current practice from the 'very important' frequency distribution for future practice. A positive value indicates an appreciation of the increasing importance of the attribute for future practice. Conversely, a negative value indicates that the attribute concerned was perceived by respondents as decreasing in importance. Table 4.6 shows the differences in the values, indicating that respondents were in agreement that all attributes listed would be of increasing importance in five years' time.

The three attributes that showed the largest changes between current and future practice were computer literacy, research competence and self-directed learning (see Table 4.6).

Table 4.6

Differences in frequencies between current and future practice as ranked by MRS practitioners and HODs

	MRS (n=356)				**HODs** (n=60)		
	Attributes	**Difference between current & future**			**Attributes**	**Difference between current & future**	
		(%)	**Rank**			**(%)**	**Rank**
G	Computer literacy	31.6	1	P	Research competence	28.4	1
P	Research competence	22.5	2	G	Computer literacy	26.6	2
LLL	Self-directed learning	17.8	3	LLL	Self-directed learning	26.6	2
PL	Initiating change	16.1	4	PL	Negotiation/political advocacy	21.6	4
LLL	Adapting to situations of change	15.5	5	LLL	Seeing the "big picture"	18.4	5
PL	Negotiation/political advocacy	15.3	6	PL	Initiating change	15.0	6
G	Managing people and tasks	14.1	7	LLL	Self management	13.4	7
LLL	Seeing the "big picture"	11.7	8	LLL	Self-evaluation	13.3	9
LLL	Self-evaluation	10.5	9	L	Leadership	13.3	9
LLL	Self management	10.4	10	LLL	Adapting to situations of change	13.3	9
G	Multi-disciplinary teamwork	8.0	11	R	Creativity and innovation	11.7	11
L	Leadership	7.3	12	PL	Risk-taking	6.9	12
R	Creativity and innovation	5.8	13	G	Managing people and tasks	5.0	13
PL	Risk-taking	4.7	14	G	Multi-disciplinary teamwork	5.0	13
G	Communication	3.2	15	P	Clinical competence	1.6	15
P	Knowledge of discipline	2.8	16	G	Communication	0.0	16
P	Clinical competence	0.2	17	P	Knowledge of discipline	0.0	16

Note: Key to attributes: P = Professional, G = generic, LLL = lifelong learning, R = reflection, L = leadership, PL = professional leadership.

The increasing importance of computer literacy and research competence reflect an increasing awareness of the need to be self-directed in learning and the importance of computer literacy in the age of digital learning. These attributes also pointed towards the importance of CPD. Despite the fact that research competence remained at the bottom of the ranking list in both current and future practices, research competence was one of the three attributes that showed the largest changes for both groups of stakeholders. This suggests that, although still perceived as unimportant, both MRS practitioners and HODs nevertheless appreciated the increasing importance of research in five years' time.

In summary, MRS practitioners and HODs were in agreement that research competence and self-directed learning and computer literacy, attributes related to CPD, were assuming increasing importance. This reflects an appreciation of the increasing importance of CPD and research in the future of the MRS profession. Results obtained from chi-square showed that there was a statistical significance between MRS practitioners and HODs' views on four attributes for future practice. Three attributes were related to lifelong learning, namely, seeing the big picture, self-management and self-directed learning. The finding concurred with interview data in which HODs highlighted the importance of attributes that are related to continuing learning, including reflection, critical thinking and ability to adopt the big picture.

In particular, half of the HODs referred to MRS practitioners' low self-esteem and subservient mentality as major barriers to practitioners' ability to continue learning.

4.3 Research Question 3

What are MRS personal perceptions of themselves as professionals?

To answer the question of whether MRS is a profession, there is a need first to determine MRS stakeholders' views (practitioners and HODs) on the issue of MRS professionalism and investigate the impact, if any, on MRS practitioners' ability to perform.

One of the main reasons MRS practitioners are not willing to accept new responsibilities is the low self-esteem they have of their own profession and the low value MRS practitioners attach to their work (Baird, 1998; Campeau, 1999). From the researcher's experience, one of the reasons commonly cited for not venturing beyond their work practices and for adhering strictly to protocols is because "We simply do what we were told". The attitude of working only within specified parameters, if true, may stifle the ability of practitioners to go beyond their comfort zone in suggesting improvement to workplace practices, thereby preventing the delivery of best possible healthcare to patients.

4.3.1 Research Question 3a: What are practitioners and HODs' perceptions of the MRS profession in relation to other health professions?

One may assume that the higher the public profile of the profession or the better informed the public is about what each profession does, the higher the chances of the profession being well regarded by the public, and this may to a certain extent, boost the level of professionalism as perceived by MRS stakeholders. The CPD Survey aimed to establish if the above assumption is valid.

For each of the professions listed in the CPD Survey, respondents were asked their opinions on level of professionalism, level of the general public regard's for the profession, and level of general public's knowledge about what each profession does (see Appendix 3.1, Section B: Q5-Q7). Respondents were asked to rate each profession on a scale of 1 (Very low/Very uninformed) to 5 (Very high/Very well informed) with 0 indicating 'Unsure'.

Level of professionalism

Although practitioners and HODs did not rate the ten professions identically, there was a consistent approach in their views of level of professionalism for the ten professions.

Both groups of respondents ranked doctors ahead of nurses. However, while MRS practitioners ranked doctors 1st and nurses 7th on the list, the HODs ranked sonographers and radiation therapists ahead of doctors and nurses at 9th ranking, just ahead of chiropractors (see Table 4.7).

Table 4.7
Level of professionalism as perceived by MRS practitioners and HODs

	Profession	**Practitioners** (n =350)		**HODs** (n =60)	
		%	**Ranking**	**%**	**Ranking**
Reference	Doctors	78.0	1	70.0	4
	Nurses	56.6	7	58.4	9
Allied health	Physiotherapists	68.6	4	81.7	2
	Occupational therapists	51.2	9	61.7	6
	Speech therapists	54.5	8	65.0	5
	Chiropractors	29.3	10	30.0	10
MRS disciplines	Sonographers	77.9	2	83.4	1
	Radiation therapists	72.1	3	76.7	3
	Radiographers	65.7	5	60.0	7
	Nuclear medicine technologists	55.7	6	60.0	7

Note: The list is based on the percentage of respondents who ranked each profession on Likert scale of 4 (High) or 5 (Very high)

Of the four allied health professions, both MRS practitioners and HODs ranked physiotherapists the highest and chiropractors the lowest. While the MRS practitioners ranked all four MRS disciplines ahead of speech and occupational therapists (eighth and ninth respectively), HODs ranked speech and occupational therapists ahead of radiographers and nuclear medicine technologists (fifth and sixth, respectively) (see Table 4.7).

Within the four MRS disciplines, sonographers were perceived to have the highest level of professionalism, followed by radiation therapists, radiographers and nuclear medicine technologists. Of the ten professions listed in the survey, sonographers and radiation therapists were ranked within the top three (see Table 4.7).

Ranking within the four MRS disciplines cannot be attributed to the percentage of MRS disciplines participating in the survey. This is because despite the fact that only 6.7% of the respondents in this survey were sonographers, they were consistently ranked 1st within the four MRS disciplines. Likewise, radiation therapists who formed only a third of the respondents (30.4%), always ranked second out of the four MRS disciplines. On the other hand, the largest majority of the respondents, radiographers (54.5%) ranked third out of four MRS disciplines. Given that one typical career progression for radiographers is to undertake postgraduate studies to embark on ultrasound career, this is one possible reason why sonographers were perceived to have the highest level of professionalism within the four MRS disciplines.

Interview data supported the survey findings. Of the four MRS disciplines, radiography was not held in the highest regard. Evidence shows that perceptions from both sonography and radiation therapy communities were that radiography practitioners lack the will, enthusiasm and motivation to continue learning in order to advance the profession forward. When asked to rate the level of professionalism for radiographers and sonographers, the HODs rated sonographers very high while giving radiographers a much lower ranking, as illustrated by the following comments:

> Sonographers I would rate very highly, 1-2. I think because ultrasound, you have to be interested in self-education to even succeed in sonography. To get your qualification, you have to be self-motivated, you have to be interested in your own self-education….. A lot of radiographers, particularly…that is not fair…those that just do general radiography, it is more a formal income for them. I don't know if they are actually highly motivated or highly interested in their work. I think they consider work a way to earn income, they may not be particularly interested in their own ongoing education and sacrificing after hours time to do their own education. So for radiographers, I probably gave a lower mark of 4, 3-4, 4 I would say. [HOD2]

> Without necessarily being too critical of my imaging colleagues, there seems to be a big stalemate in them moving on to where they want to head in the future, at least in the direction of the future under the Australian Institute of Radiography. The radiation therapists however, I think, are fairly clear that they want to be more professional, they need to be more accountable, they need to do CPD. [HOD7]

In summary, the CPD Survey showed that of the ten health professions listed, both groups of respondents perceived MRS practitioners, particularly sonographers and radiation therapists, to have a relatively high level of professionalism. This is evident from the fact that both sonographers and radiation therapists were rated by 70% to 85% of respondents as having a very high level of professionalism, which is comparable with 70% to 80% for doctors. Although radiographers and nuclear medicine technologists were perceived by only 55-65% of the respondents to have achieved a very high level of professionalism, these figures are comparable with the rest of the allied health professions, such as speech and occupational therapists, which were rated by the same percentage of respondents (55-65%) as having achieved a high level of professionalism. This implies that MRS practitioners are perceived by both groups of respondents to have a high level of professionalism.

The survey findings contrasted with current MRS literature, which reports on the dominance of the medical profession resulting in widespread apathy, poor self-esteem of MRS practitioners and a low profile of the profession. So how does one explain the seemingly contradictory data of high levels of professionalism reported in the survey findings?

One possible explanation is the manner in which survey respondents defined ‘profession’ and ‘professionalism’. The majority of survey respondents may have adhered to the narrow definition of being a professional. For them, to qualify as a ‘profession’ is one who is a member of professional association, guided by a professional code of conduct, having received a university education, and possessing a specialised set of knowledge and expertise (see Chapter 2, Section 2.3.2). Given that they have achieved the objectives of imaging/treatment duties to their patients and performed their clinical responsibilities competently, they felt entitled to claim a high level of professionalism. From the personal experience of the researcher, this view certainly held true for many radiographers.

Interview data provided further evidence to substantiate this narrow scope of being a professional. HODs interviewed felt that practitioners do not appreciate what it takes to be a ‘true’ professional. For instance, there seems to be a lack of appreciation and understanding by some practitioners that pursuing CPD is one of the many responsibilities of a health professional, as the following comment illustrates:

> A lot of them don’t necessarily realize that to be a true professional means a lot more than some of us are prepared to bargain for. [HOD7]

In addition, at least two of the HODs interviewed expressed the opinion that few practitioners appreciate the level of responsibilities that accompanied professional status, as the following comment illustrates:

> I say the majority of people, radiation therapists, the majority do want to extend their practice and they say that theoretically. Of that majority, maybe only 50% realize the reality, what it actually takes to get that far. [HOD7]

Another possible reason for the perceived high level of professionalism is that, while the survey rating reflected respondents' perception, they were also acutely aware of where MRS practitioners fell short in some aspects of professionalism. This group of survey respondents has therefore provided open-ended comments highlighting the challenges currently faced by the MRS profession. Examples of these open-ended comments are provided in Section 4.3.3 in Research Question 3(c).

Level of general public regard

Table 4.8 presents the level of general public regard for the ten health professions, as perceived by MRS practitioners and HODs. Again both practitioners and HODs responded in a similar manner (see Table 4.8).

Table 4.8
Level of general public's regard for each profession as perceived by MRS practitioners and HODs

	Profession	**Practitioners** (n =350)		**HODs** (n =60)	
		%	**Ranking**	**%**	**Ranking**
Reference	Doctors	87.2	1	90.0	1
	Nurses	58.6	3	78.0	2
Allied health	Physiotherapists	64.3	2	65.0	3
	Occupational therapists	25.4	9	25.0	8
	Speech therapists	27.0	8	35.0	5
	Chiropractors	28.4	6	30.0	7
MRS disciplines	Sonographers	42.1	4	35.6	4
	Radiation therapists	40.0	5	35.0	5
	Radiographers	27.7	7	23.3	9
	Nuclear medicine technologists	22.9	10	16.7	10

Note: The list is based on the percentage of respondents who ranked each profession on Likert scale of 4 (High) or 5 (Very high)

As expected, doctors were rated as having the highest level of public regard while nurses fluctuate between 2nd and 3rd ranking by HODs and practitioners, respectively. Physiotherapists were ranked ahead of the four MRS disciplines. They were followed by only two MRS disciplines - sonographers and radiation therapists - with radiographers and nuclear medicine technologists ranking behind the majority of the allied health professions. Thus, of the ten professions listed here, radiographers and nuclear medicine technologists were being perceived as the allied health professions to have the lowest level of general public regard. As reflected by one HOD, "There isn't the respect given…we are not seen to be important" [HOD8].

Level of public knowledge of each profession

Table 4.9 provides a breakdown of the respondents' perception of level of public awareness of each profession.

Table 4.9
Level of public knowledge of each profession as perceived by MRS practitioners and HODs

	Profession	Practitioners (n =350)		HODs (n =60)	
		%	Ranking	%	Ranking
Reference	Doctors	68.6	1	75.0	1
	Nurses	59.8	2	66.7	2
Allied health	Physiotherapists	44.3	3	49.2	3
	Occupational therapists	4.0	9	1.7	9
	Speech therapists	11.2	6	11.7	5
	Chiropractors	9.2	7	16.6	4
MRS disciplines	Sonographers	12.0	5	8.3	6
	Radiation therapists	5.7	8	5.0	8
	Radiographers	13.1	4	6.7	7
	Nuclear medicine technologists	1.8	10	0	10

Note: The list is based on the percentage of respondents who ranked each profession on Likert scale of 4 (High) or 5 (Very high)

Of the ten professions listed, doctors and nurses were reported to have the highest public profile. Both groups of stakeholders perceived the public to be the best informed in terms of what doctors and nurses do. Physiotherapists again occupy the top of the list after doctors and nurses, with respondents indicating that the public is least informed about what nuclear medicine technologists (10th position), occupational therapists (9th position) and radiation therapists (8th position) do.

Of the four MRS disciplines, both MRS practitioners and HODs were in agreement that the public was better informed about what sonographers and radiographers do, compared to what radiation therapists and nuclear medicine technologists do. This finding suggests that both radiographers and sonographers have attained a higher profile than their radiation therapy and nuclear medicine counterparts.

Open-ended comments from the CPD Survey were congruent with the survey data reported in Table 4.9. Respondents were unanimous that given the low profile of the MRS profession, MRS practitioners need to assume a more proactive role in the promotion of the profession, as the following comments illustrate:

> Radiography suffers from a general lack of understanding in the public eye. We are either classified by the public as doctors or nurses. It really is up to us to educate the public about what we do and our role in the health system. Without this education we may not receive the recognition of being a profession in the public eye. [Radiography: 96]

> I feel that the profession still has a long way to go to "clean" up its act. The general public's awareness of the 3 disciplines is very limited and this needs to change. [RT: 94]

> We have to be actively involved in the development of our profession and bringing it to the general public's knowledge. [RT: 99]

The need for MRS practitioners to be proactive in raising their profile is raised by one HOD as follows:

> If they have a higher profile; if people knew what they did, then they would have a more active role in the health profession. They would be consulted when decisions are being made about services and service delivery. It is just that we disappeared, people don't know what we are. [HOD8]

4.3.2 Research Question 3b: How, if at all, do perceptions differ between practitioners and HODs?

In summary, both groups of stakeholders were consistent in their view on the three issues. On the issue of levels of professionalism and public regard, both MRS practitioners and HODs consistently ranked sonographers and radiation therapists ahead of radiographers and nuclear

medicine technologists. On the other hand, the general public was perceived by both groups of respondents to be better informed about what sonographers and radiographers do.

In terms of professionalism, Chi-square conducted shows that within the four MRS disciplines, radiographers are the only MRS discipline that has been identified as statistically significant (see Appendix 4.3). The manner in which both groups of respondents ranked radiographers' professionalism may account for this discrepancy. While MRS practitioners ranked radiographers in the middle of the 10 professions, HODs ranked radiographers in the bottom half of the list.

MRS profession: Professionalism, public regard and public knowledge

Of the four MRS disciplines, sonographers and radiographers were the two disciplines perceived to have the highest public profile. The assumption that higher public profile generally results in higher public regard and higher level of professionalism seems to hold true for sonographers. Sonographers were perceived to be one with the highest public profile, and were perceived to be highly regarded by the general public, as well as to have attained the highest level of professionalism. However, the radiographer data painted a different picture. Despite the fact that radiographers were perceived to be one of the two MRS disciplines to attain a higher profile, they were neither ranked first nor second in terms of the level of public regard and level of professionalism. Instead, radiation therapists were ranked second, in terms of public regard and professionalism, after sonographers (see Tables 4.7, 4.8 and 4.9).

This limited association between public knowledge, public regard and professionalism suggests that public knowledge of the profession alone, does not by itself guarantee a high level of public regard and professionalism. There were other factors that determined the level of professionalism of any profession. A glimpse of these 'other factors' was made possible with the survey open-ended comments and interview data, which are considered in the next section.

4.3.3 Research Question 3c: Does the level of perceptions of MRS professionalism impact on MRS practitioners' ability to deliver the best possible healthcare?

This section considers whether the level of perception of professionalism as perceived by MRS practitioners in any way impacts upon their ability to deliver the best possible healthcare for patients.

One would assume that with MRS practitioners perceiving themselves to have a high level of professionalism, it would have provided them with the confidence to move forward in enhancing and advancing their workplace practices. However, despite the survey findings, data obtained from survey open-ended comments and HODs' interviews showed a less positive view of MRS professionalism. A number of issues were raised, namely barriers to CPD participation and challenges confronting the MRS profession, issues that directly impact on MRS professionalism (see Chapter 2, Section 2.3.2). The data highlight the underlying issues of MRS professionalism and provided evidence that these professionalism issues were having an impact on MRS practitioners' ability to deliver best possible healthcare.

One way in which quality healthcare can be achieved is by advancing workplace practices through constant evaluation and reflection of current workplace practices. However, in order for practitioners to be able to reflect and evaluate on their existing practices, practitioners need to continue learning and be continuously engaging in CPD. Data obtained from survey open-ended comments and HODs interviews identified two major obstacles in preventing MRS practitioners from advancing workplace practices. First, barriers to CPD participation and second, challenges confronting the MRS profession. The data confirmed MRS literature on the challenges currently confronting the MRS profession (see Chapter 2, Section 2.3), and that these challenges have indeed impacted on MRS practitioners' ability to deliver best possible healthcare.

Barriers to Continuing Professional Development

While the need for continuing learning is recognised by survey respondents, a number highlighted the need to address several barriers to CPD participation, including the lack of reward on successful completion of formal studies and the cost of engaging in CPD activities. This view is reflected in the following comments:

> One problem at the moment is the lack of incentive to undertake further education. University fees are not cheap, are up front (not everyone has that money on hand) and

> usually will not net you any monetary gain. Why study then if someone with a masters receives the same pay as someone without. [Radiography: 96]

> There is no financial reward for somebody, say entering a 2-3 years of postgraduate qualification. They are getting paid the same and will continue to be paid the same, as the one sitting at benches…. you must fund yourself. There is a lack of incentives there. You are looking at highly motivated staff, who are actively pursuing courses. [HOD3]

Practitioners find the cost of enrolling in formal postgraduate programs prohibitive, especially in view of the lack of financial reward. Although referring to online learning as a form of CPD, the comment below epitomises the concerns of many:

> I think online learning is a great idea and is accessible to a large number of MRS. However, the cost needs to be minimal. We live in an age where most people have HECS debt, mortgage, numerous professional fees eg. registration licensing and accreditation. [NM: 129]

Another barrier to CPD lies in practitioners' parochial view of CPD, failing to appreciate that mandatory CPD is also an accountability issue and is already in place in established professions like medicine and nursing. This parochial view is illustrated by the following comment:

> I feel there are a select few busybodies in the profession who seek to force their self-indulgent agendas onto all radiographers. Compulsory CPD is one such agenda. Little to no effort is made on improving the pitiful award wages for radiographers but these busybodies wish to make us work harder on 'professional development' for no financial benefit. They want us to be the most highly educated, poorly paid professionals. Instead of trying to improve our working conditions these people insist on trying to make our working life more difficult. We must be one of the most poorly remunerated 'professionals' in the nation. You constantly see nurses, police, teachers, labourers etc taking industrial action to improve their conditions but where are radiographers? I know many people with zero education in cleaning jobs or menial labouring jobs earning more money per hour than most radiographers do. Until this is addressed I consider our 'profession' a mickey mouse one.
> [Radiography: 92]

Another practitioner who tendered her resignation after being a member of the Australian Institute of Radiography for 40 years, felt mandatory CPD implementation to be a severe requirement of membership, as illustrated by the following comment:

> I have not and do not intend to participate in CPD…I wish the AIR [Australian Institute of Radiography] well, but feel they will not attract members and will certainly lose some with this harsh stipulation. (Russell, 2004)

The sentiments expressed by the above two practitioners showed a lack of willingness on the part of MRS practitioners to engage in mandatory CPD. One may argue that it is the mandatory component and not CPD per se that triggered the above comments. It is nevertheless the researcher's opinion that too often, practitioners hide behind the 'mandatory' element when in reality, they are not inclined to participate in CPD. The above comments reflect a failure to understand the increasing need for accountability called upon by stakeholders such as the public and the government. Although 20% of HODs interviewed were sceptical of mandatory CPD, only because of their concerns that some practitioners will simply see the accumulation of CPD points as an end in itself, all HODs were supportive of it. They saw it as a natural progression of health professions as the following comment shows:

> Because of the expanding nature of the profession, that if we want to be seen to be able to be a significant part of the medical profession, that we need to be doing all the things that doctors and physios are doing, they have had CPD for ages now. The government is pushing everybody that way, anyhow, to provide a better service for patients. It is just a matter of progression, it will happen. [HOD1]

There are no data available to indicate the percentage of MRS practitioners who were against mandatory CPD. However, prior to the introduction of mandatory CPD, only 31% of Australian Institute of Radiography members participated in voluntary CPD (Brown, 2003a). This suggests that the support for mandatory CPD is unlikely to be widely embraced by the MRS professional community.

One HOD interviewed identified another barrier, an attitude of 'I know it all', that prevents practitioners from engaging in CPD, as the comment below illustrates:

> The attitude I referred to earlier about the person who came in, has been in the world working for 10 years, and reckoned she has got nothing to learn, nothing further to learn, or there is no where else for radiography to go, is another attitude that is a big, big problem. [HOD8]

Lack of career progression is another barrier in preventing practitioners from participating in CPD. MRS practitioners lack the motivation to learn as the MRS profession holds few opportunities for career advancement, as illustrated by the following comment:

> At the moment – limited regional opportunity…limited career path (someone has to retire!), no shift opportunities to enhance income, low wage for the responsibility we are asked to take in this litigious age! CPD will be compulsory from next year (more study, no reward) [RT: 347]

Challenges confronting the MRS profession

While the above barriers are preventing MRS practitioners from participating in CPD, the following data support findings in MRS literature that the challenges currently confronting the MRS profession are also preventing MRS practitioners from delivering the best possible healthcare. These challenges include apathy, dominance of the medical profession, low self-esteem, low profile and unwillingness to assume additional clinical responsibilities (see Chapter 2, Section 2.3).

Survey respondents and HODs reported on the widespread *apathy* of the MRS profession, as illustrated by the following comments:

> History suggests the majority of MRS practitioners will not act to improve the status. [Management: 27]

> Radiographers on the whole are an apathetic lot. The advancement of the profession will happen with a dedicated few and the backing of the AIR [Australian Institute of Radiography]. Once everything is in motion, most radiographers will go along with the flow as it is easier than fighting. [Management: 87]

One HOD highlighted the existing attitude of the majority of MRS practitioners as follows:

> If it ain't broke, don't fix it – will be the prevailing attitude with a lot of people. [HOD8]

The *dominance of the medical profession* and lack of professional autonomy have been identified by survey practitioners and all HODs interviewed as one of the major barriers in preventing motivated practitioners from advancing workplace practices, as the following comments illustrate:

> The profession appears to be stagnating in some areas, due mainly to the overriding control of radiology over roles and responsibilities. Most MRS practitioners are capable

> of assuming far greater and wider responsibilities. Those that want to, face significant limitations and restrictions to role and career advancement.
> [Radiography: 200]

> And part of maybe what, in a way, stifles to be a fully emancipated profession is our history with our working relationship with the doctors, and the turf war associated with who is in control. [HOD7]

Another practitioner echoed the same sentiment and advocated taking the future into one's own hands, as reflected in the comment below:

> In my experience of this [MRS] profession in this country, we are all too apathetic to do this [role expansion], but expecting others to do it for us. It is time we stopped whinging about our lot and go out there and created our own future! [RT: 6]

The *lack of professional autonomy* proves to be most frustrating even for chief radiographers. One HOD described his experience of refusing to perform inappropriate examinations that had been ordered by casualty doctors. He recognised that he was only able to defy the clinician's request because of his knowledge and years of experience and noted that a new graduate would not be in a position to do so, as the following comment illustrates:

> There is nothing worse than as a professional, it happens occasionally, somebody disagrees with something, it boils down to them saying: I am telling you to do it. [HOD4]

The same HOD also spoke of his frustrations in his attempts to suggest workplace changes to radiologists and lamented at the current radiologist dominance over radiographers, as illustrated by the following comment:

> We are in a difficult position. I find as radiographers in the current structure, we are always answerable to radiologists. And it just makes it very difficult. I have done this a couple of times and you get dreadfully frustrated. You do a little bit or research into something relatively simple, like projections of sinuses or IVP, whatever it might be. You find there is a clear direction you should be going in, and you present it to the radiologists. No, "you don't want to do it". "Why not?" "Just don't want to do it!". It is very soul-destroying, very soul-destroying. I think the relationship between radiographers and radiologists is definitely a huge obstacle. [HOD4]

Another HOD spoke of the need to be recognised as an autonomous profession:

> I think we need to get out from underneath the radiologists' shirt tail as far as that is concerned and hopefully become a profession in our own right. [HOD1]

Practitioners also equated the future of the profession to their ability to move into roles that will give them more autonomy as illustrated by the following comments:

> For the status of the MRS professions to be improved, MRS practitioners need to have their roles expanded and have more professional independence, in future. [Radiography: 81]

> Needs increased autonomy from doctors, greater opportunities for professional development, improved technology. [RT: 232]

In addition, the lack of professional autonomy was identified as one major reason for the *low self-esteem* of MRS practitioners, as the comment below shows:

> The self-esteem of radiographers has always been a major problem. Many have it but a large percentage are [sic is] beholden to the radiologist dominated scene. The same goes for ultrasonographers. Many radiographers have 2-3 postgraduate qualifications but their expertise & opinion doesn't carry the authority of an RMO or GP who are "on paper" less qualified. Because of their master/slave relationships radiographers will always be seen as the lesser "profession" because of the association they uniquely have with doctors. Over the years, I have seen many radiographers who are happy to play second fiddle to radiologists – rather than to be equal in the treatment of diagnosis services offered to patients. [US: 282]

As a result of the low self-esteem, HODs interviewed expressed concerns at the 'subservient attitude' and 'hand-maiden approach' of MRS practitioners to the medical profession and the hierarchical relationship imposed on MRS practitioners. One HOD identified such practitioners' attitude as the major hurdle in preventing MRS practitioners from advancing workplace practices, as the following comment illustrates:

> Really the main thing is to try and stop our current attitude that probably still comes out of the profession, and that we follow whatever the radiologists tell us to do, and that is our rotten life, and that is the way it goes. [HOD1]

In the MRS workplace, where there is an expectation of conformity, one HOD interviewed described the prevailing attitude of radiographers as follows:

> We are just like shop assistants here, we get customers here and we will go and serve them. And they [MRS practitioners] will serve them [patients] well. They [MRS practitioners] will come back and say, 'Well, you can't complain, I am doing the job I am being paid for'. But if you think about how much they are being paid for, it is a professional wage they are getting. Which, I assume being a professional wage, is about $10,000 more than somebody in the IT industry for example. There is an expectation that they will keep up with recent developments, and keep on learning and going ahead. [HOD8]

In addition, the ability to advance workplace practice is dependent on MRS practitioners' ability to think critically. One HOD spoke of practitioners having the 'Done-to culture', with the prevailing attitude of "Do it to me, I am here, you tell me what to do" [HOD6], all of which stifle the idea of creativity and critical thinking.

This lack of self-confidence and low self-esteem were echoed by 50% of HODs interviewed. One HOD felt that there is an urgent need for radiographers to learn to assert their authority more by sharing and articulating their knowledge in the workplace. Very often, she could 'see' radiographers thinking:

> You [radiologist] don't know what you are talking about! But I wouldn't dare contradict you because I am just a radiographer. [HOD8]

The encroachment of other professions into the radiographer's arena was perceived as an indication of *practitioners' low profile* and lack of professional standing amongst health professions, as illustrated below:

> We're going to have real problems moving forward (more likely to move backwards by standing still as others pass us by in fact) as long as we are still being told what to do by other people/professionals. As an example, instead of NIXR why not have the triage nurse refer the patient to the radiographer for appropriate imaging - if any. How did we ever let another professional group other than ourselves tell us what to do? As it is, we all know more than most of the medical profession about appropriate imaging. [Radiography: 171]

One practitioner lamented about the lack of recognition by other health professions of radiographers' expertise as the comment below illustrates:

> I feel that we should be able to refuse to perform some exams on a patient advocacy basis. But until our professional opinion is more appreciated we will continue to see requests for examinations that are inappropriate. [Radiography: 360]

Moreover, there are practitioners who refuse to assume additional responsibility, preferring instead to have others assume the responsibility, as the comment below illustrates:

> You tell us what to do, and if something goes wrong, you are to blame, not me. Or it is not my fault that it didn't happen." [HOD6].

As a result, by refusing to take the risk of decision-making, practitioners do not venture beyond their tightly defined responsibilities and are therefore failing to take on the responsibility of advancing workplace practices, as the following comment illustrates:

> It is that acquiescence which can be a stumbling block. It prevents not just what's holding us back from greater responsibility, it is holding us, some of us, back from a whole lot of development stuff in ourselves. Some people want to be held back, though. [HOD6]

In summary, although the survey statistics show MRS practitioners perceiving themselves to achieve a relatively high level of professionalism, the qualitative data show a number of underlying characteristics of non-professionalism. CPD is an essential component of professionalism, yet barriers to CPD are serving as major hindrances to practitioners' continuing learning. As discussed in Chapter 2, Section 2.3.2, the MRS profession is an emerging profession struggling under the dominance of the medical profession. The low profile and lack of professional autonomy result in a vicious cycle of low self-esteem and widespread apathy. With the exception of a minority of motivated MRS practitioners, these factors are preventing the majority of MRS practitioners from wanting, willing and being able to advance workplace practices, and hence, being able to deliver the best possible healthcare for patients.

The next section considers Research Question 3: Is MRS a profession?

The survey findings that the majority of respondents perceived MRS practitioners to have a high level of professionalism is positive and augurs well for the future of the profession. However, the survey open-ended comments and interview data revealed the challenges currently facing the MRS profession. These problems and challenges explain why some practitioners held grave concerns for the future of the profession and it possibly explains why

41% of the practitioners felt that the status of the MRS profession would remain the same in five years' time (see Figure 4.5).

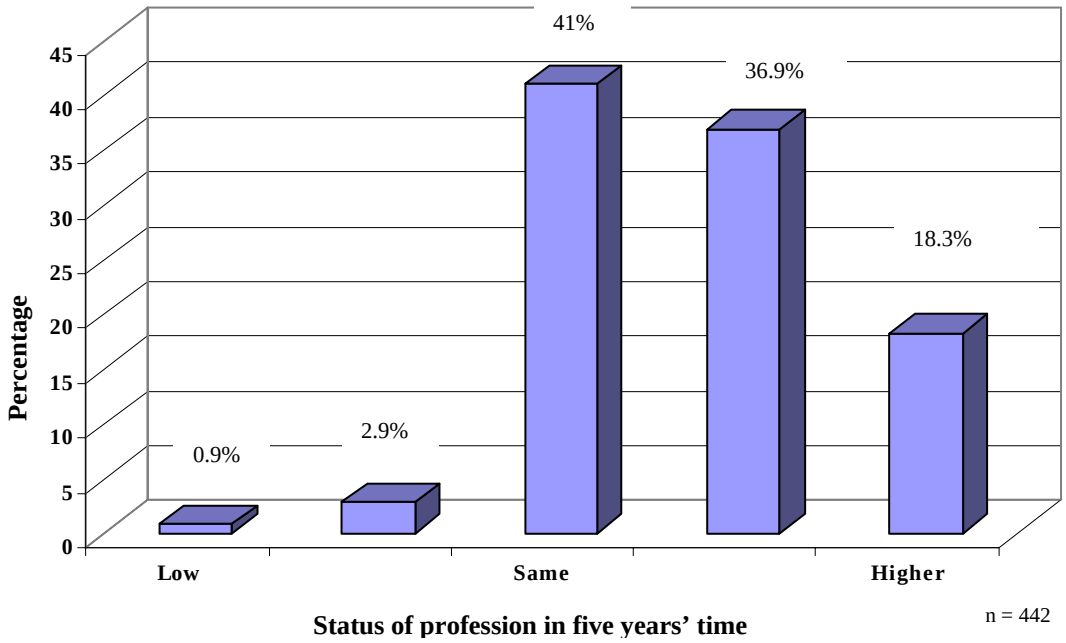

Figure 4.5
Future of MRS profession in five years' time

So is MRS a profession? Qualifying as a profession is not solely dependent on the perceptions of members and the professional body. The standing of a profession is also dependent on assessment by the public and healthcare professions (Millerson, 1973). The MRS profession is an emerging profession. Thus, much work needs to be done by MRS practitioners themselves to bring the profession and themselves onto a level that is recognised, appreciated and valued by others in the health profession and the public. Until then, the comment below by one practitioner will probably plague the profession for a long time to come:

> At present I don't think we, as a profession, are regarded/rewarded in terms of respect, status and pay. [Radiography: 302]

However, there are reasons for optimism. More than half of survey respondents (54%) felt that MRS practitioners are not currently maximising their potential and they are capable of assuming additional clinical responsibilities. In addition, more than half of the survey respondents (55%) indicated that the MRS professional status would be higher in five years' time (see Figure 4.5). These figures, perhaps, represent a level of optimism and willingness that will ultimately move the MRS profession forward.

4.4 Research Question 4: Workplace culture

Research Question 4 focuses on practitioners' workplace culture in terms of CPD. Specifically, the question seeks a better understanding of the issues that may encourage or discourage practitioners to pursue further learning and the type of support provided by MRS employers. This information will assist the MRS workplace and academic leaders in adopting approaches that will encourage practitioners in their CPD.

4.4.1 What are the factors that influence MRS practitioners' decisions to engage in CPD?

In order to identify the factors that influence practitioners' willingness to engage in CPD, respondents were asked to rate a number of factors on the level of motivation to participate in CPD on a Likert scale of 1 (Very low) to 5 (Very high). They were also asked to rate the level of deterrence some of the factors to participating in CPD. In this instance, there was a very large percentage difference between responses on the Likert scale categories of 4 and 5. Thus only category of 5 has been recorded for 'Very high'.

Factors that motivate MRS practitioners to participate in CPD

The data show that extrinsic rewards have a slight edge over intrinsic rewards. Salary increment was ranked as the most important factor that motivates practitioners to continue learning (30.7%). All other factors, including attainment of qualification, promotion, receiving financial support from employers and the need to learn more about current job, received equal emphasis, ranging between 23% and 25%. Thus, extrinsic rewards such as salary increment and promotion were considered to be highly motivating, with attainment of specialist qualification, an intrinsic factor, was considered to be the second most motivating factor (see Figure 4.6).

Financial support from employers, in the form of tuition fees, internet access and office facilities, was rated as an important incentive (23.7%). The need to learn about the current job, an essential element of a health professional, was rated as marginally lower (23.4%) than the first four motivational factors (see Figure 4.6).

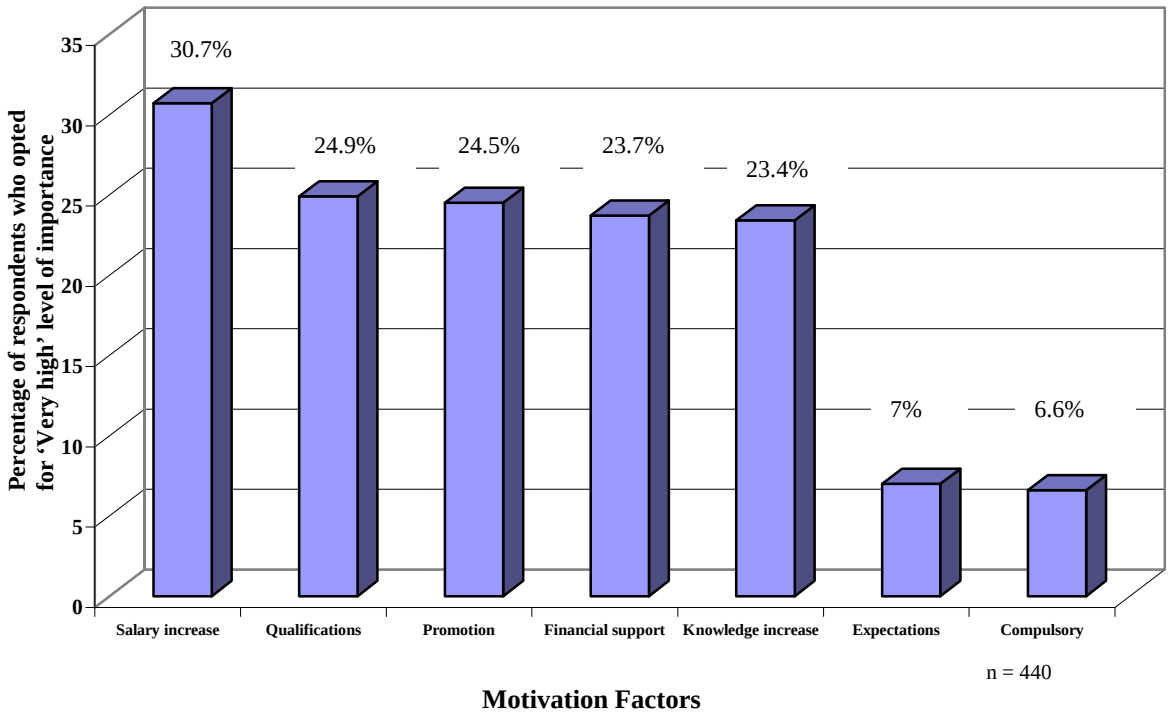

Figure 4.6
Factors that motivate MRS practitioners to participate in CPD

The factors that least motivate practitioners to want to learn are 'expectations from management' and because it is 'compulsory in the workplace to continue learning', scoring only 7% and 6.6% respectively (see Figure 4.6). This shows that MRS practitioners do not regard mandatory CPD to be an important motivating factor.

Factors that deter MRS practitioners from participating in CPD

The two most important factors that deterred practitioners from pursuing CPD were time factor and cost (see Figure 4.7). Time factor refers to lack of 'free' time due to family commitments, lack of relief from work to attend courses, and shift work. The study by Sim (2000) and the present study both showed that shift work was identified as one of the main reasons in preventing MRS practitioners from continuing learning, as they were often too tired after work to stay focused for a lengthy period of study.

Inability to access learning support and lack of interest were not perceived as major deterrent factors, with only 8% and 7.8% of the respondents rating these factors as very high deterrence (see Figure 4.7).

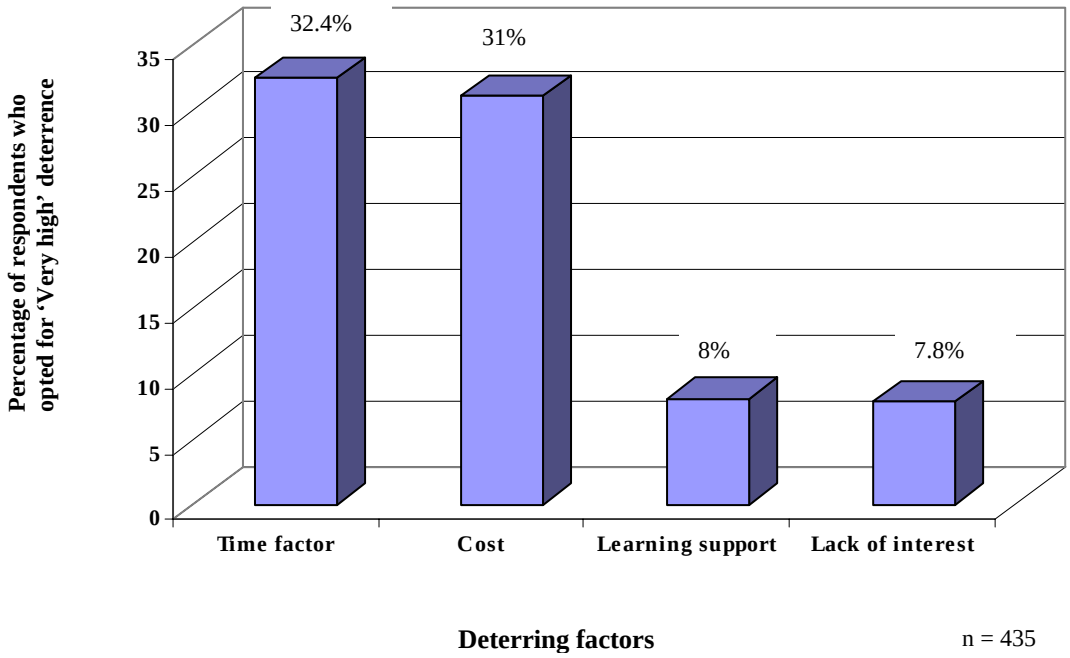

Figure 4.7
Factors that deter MRS practitioners from participating in CPD

These findings have significant implications in terms of practitioners' CPD. Given that cost of CPD has been identified as a major deterrent, the increasing costs associated with formal postgraduate studies will only serve to deter practitioners from pursuing formal postgraduate education. In addition, formal studies require a relatively lengthy time commitment, which most practitioners felt they are unprepared to commit.

CPD support in the MRS workplace

Respondents were asked to rate the importance of CPD support in the workplace. Conference support was rated as the most important form of support (41.5%), with the other three forms of support, namely, time off from work, office facilities and tuition fees, regarded as equally important (33.9% to 36.5%) (see Figure 4.8).

Respondents were also asked to indicate the availability of such supports in the workplace. Two-thirds of the practitioners indicated that they received some form of financial support for conference attendance and the use of office facilities such as photocopier, printer and internet access. Slightly more than half of the respondents (55.1%) indicated that they were able to take time off from work to participate in CPD activities (see Figure 4.8).

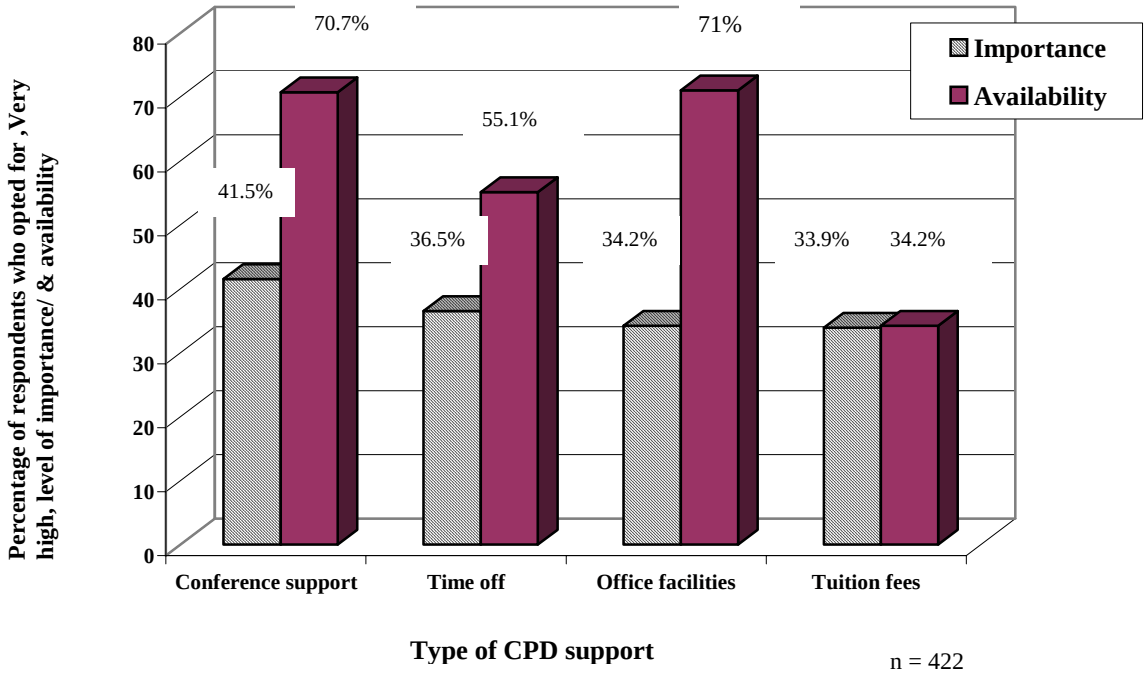

Figure 4.8
CPD support in the MRS workplace

On the issue of role expansion, the importance of CPD was highlighted in the CPD Survey. The majority of survey respondents were unanimous that the only way for the MRS profession to move forward is for MRS practitioners to assume additional clinical responsibilities, with 54% of the respondents indicating that MRS practitioners are capable of assuming greater responsibilities and that they are not currently maximizing their potential. Another 30% of respondents felt that the roles of MRS should be evolving with only 9.2% stating that current roles of MRS practitioners are adequate (see Table 4.10).

Table 4.10
Respondents' view on future roles of MRS practitioners

Future roles of MRS practitioners	Percentage (%)
The current roles of MRS practitioner are adequate, ie. there is no need for change	9.2
Other allied health professions are evolving, so should MRS	29.9
MRS practitioners are not maximizing their potential ie. they are capable of assuming greater responsibilities	54.4
Unsure	2.5
Other	4.0

Note: (n = 445)

Along with role expansion, came the appreciation for the need to participate in CPD as reflected in the following comment:

> I think it's great that the potential exists for further MRS responsibility and role in patient management. However there needs to be a much greater level of education to go with that responsibility. One must remember that MRS practitioners have had only partial education in comparison to that of radiologists, and limited education and good intentions can be dangerous in our profession. [Radiography: 138]

Concerns were expressed at how CPD support is currently being targeted at high achievers and well motivated practitioners who are committed to pursuing formal studies, while neglecting the majority of practitioners who are just as keen to learn but lack the resources in terms of time and financial resources for formal studies, as the comment below illustrates:

> If staff wants to do a course or subject, they can come to me, on a 1-1 basis, and the practice will give them 50% financial support. There is an inequality that happens there…It doesn't target the group of people who are still happy to learn, but learn intimately, on an ad-hoc basis...So there need to have a good educational policy that just doesn't target the high achievers, people that are academic type practitioners or bigger research type groups which we currently brings on board with the 50% type of thing. Look at something that offers versatility, right down to developing a patient satisfaction questionnaire, which we get people to do etc. and giving them time to do that. [HOD7]

There is therefore a need for the MRS workplace to develop a more inclusive approach in supporting practitioners in their CPD.

4.5 Action Research Cycle 1: Refine Research Question 1

Research Question 1 reads: What are the design features of an educational framework needed for a CPD program to meet the current and future needs of the MRS profession? However, Research Question 1 needs to be refined by further defining the current and future needs. By being more specific in terms of what the educational framework is to achieve, it is possible to design an online module that will specifically address these needs, and to establish criteria to evaluate the success of the module. Using the data from the CPD Survey and interviews, the researcher reflected on the data, with the aim of identifying the needs relevant to the future of the MRS profession.

4.5.1 Analysis, synthesis and reflection of data

Data collected from the First Research Phase show the attributes MRS practitioners needed for current and future practice. In order of importance, attributes relating to clinical performance were ranked as the most important, followed by continuing learning with attributes relating to workplace advancement ranked as the least important (see Sections 4.2.1 and 4.2.2). The interview data, in particular, highlighted four needs of the MRS profession, namely, reflection, empowerment, impact on the workplace and professional networking.

Need 1: Reflection

Interviews with HODs highlighted an important attribute that is currently lacking in the MRS profession namely, the ability to reflect on workplace practices. Aside from the lack of reflection (see Chapter 2, Section 2.4.1) the issue of productivity in the workplace also accounted for MRS practitioners' adherence to workplace protocol. HODs interviewed recognised clinical competencies to be important attributes in ensuring services are provided in an efficient and competent manner. However, the quest for efficiency has resulted in a workplace culture where clearing the workload is paramount, to the exclusion of other equally important considerations as evident in the following comment:

> I think what holds us back is that we are in a culture of, for want of a better word, perform-tivity, that we have to get the job done, we have to get the patients treated, everything else is secondary to that. And that does sometimes make it difficult for people to reflect on their practice, look at what might be possible. [HOD6]

Practitioners are not given the time and space to reflect as illustrated by the following comment:

> We are too busy getting the patients treated. So the opportunity to smell the roses and reflect is a luxury. [HOD6]

The need to accumulate points to validate CPD activities was viewed by HODs with some scepticism. One HOD spoke of the importance of reflecting on what one has learned, instead of merely seeing the attendance of seminar and conferences as an end in itself.

> If they go back to work after those seminars, and they don't change what they do, if they don't reflect on what they learned, and say "maybe I can introduce this, maybe I can talk about change here, maybe I can institute change." If they don't do that, then they got nothing out of it. [HOD8]

The ability to reflect also requires the ability to think critically. Another HOD linked the importance of lifelong learning attributes, the ability to see the big picture and the ability to think critically, to ongoing changes in the workplace, as evident in the following comment:

> Is sort of seeing a big picture approach, a holistic approach…being able to link the change and the context to the activity you want to do. Rather than just being told "Just do it and get on with it." You do have to think critically. [HOD6]

Thus, the inclusion of reflection, as one of the learning aims and learning activities, will address a future need of the profession. Thus, Research Question 1 is made more specific by including reflective practice as the main aim of the online module.

Need 2: Empowerment

Dominance of the medical profession, feeling devalued, low self-esteem and lack of confidence, all point towards a need for CPD activities to empower MRS practitioners. Empowering has to begin with an appreciation of what each individual brings to the workplace. The failure of practitioners to value their work was reinforced by one HOD, as the following comment illustrates:

> It is part of my job, and I come to work and this is what I do. So it is devalued, it is deleted. It is not seen. [HOD6]

Education is about empowering individuals and expanding their potential thereby opening opportunities that they would not otherwise envisage. And reflection is one way in which practitioners can be empowered and be encouraged to act on their problems, instead of simply accepting their current predicament as unchangeable (Bolton, 2001). Thus, empowerment has been included as another objective of the online module and has been included in Research Question 1 as one of the learning outcomes.

Need 3: Impact on the workplace

One of the important outcomes of CPD participation should be a positive impact on the workplace. Thus, CPD activities have to be more than mere acquisition of knowledge for the practitioner concerned. The learning by the individual practitioner has to result in some form of transformation, be it at a conceptual or tangible level, for the individual and if possible, leading to positive outcomes in the workplace.

One of the ways of bringing about changes in the workplace is to have practitioners adopt an inquiry approach, for example by engaging them in minor EBP projects and mini-action research. This strategy involves experimenting and trying out new things approaches. Research involves "looking at improving your practices and evaluating where you want to go." [HOD7]. This HOD went on to explain how EBP can be applied in the MRS workplace, as the following comment illustrates:

> ... looking at other peoples' findings and seeing how you can incorporate their research finding into your practice and make improvements….. looking at what is happening outside of them and analysing and saying 'Hey, that would be valuable to how we are currently working and taking on some information.' So you may not be part of that research but you can use the end result and improve." [HOD7].

The following comment highlights the importance of reading and reflecting on literature:

> Is not necessarily about doing research, but finding out where that research is and then applying those principles into your practice too … it becomes sort of workable and it becomes interesting, because is related back to your current working environment as well and is real. And it involves a lot more people and that's important. [HOD7]

Thus, including information literacy and EBP as part of learning activities assist participants in applying EBP approaches in their workplace, thereby ensuring acquired CPD learning can impact on participants' workplace. Although the EBP element was not explicitly worded in Research Question 1, EBP outcomes form one of the evaluation criteria of Kirkpatrick's evaluation model.

Need 4: Professional networking

71% of survey respondents reported that the workplace provides some form of financial assistance for conference attendance. All HODs interviewed also cited conference support as an important workplace support. However these funds are often limited with only a few staff securing successful sponsorship each year. Despite the fact that only a handful of staff benefited, conference attendance is still being viewed as an important means of keeping staff motivated, as evidenced by the following comment:

> Networking with fellow professionals is a very important way of getting extra information. [HOD1]

CPD activities that can result in successful professional networking for practitioners will be an ideal complement for conference attendance. Such a form of extended support network presents an efficient form of authentic learning for professional practice and can be conducted through professional associations such as Australian Institute of Radiography. In addition, having community of practice online will enable more practitioners to access professional support network that is not constrained by physical location and limited finances. Such a professional network is especially relevant to rural and regional practices, where practitioners experience more difficulties accessing CPD activities than their city counterparts.

Professional networking will also prevent practitioners from adopting a parochial view of the MRS practice and the profession. The obstacles to acquiring a big picture were listed by one HOD as follows:

> I think people just don't see outside the square as to what opportunities are coming at them and maybe that partly because you just don't get the time to go to Conferences, your employers don't let you out or you are just happy to do your work and go home. Is just a matter of dragging yourself out from that perception of your career and try and expand it. [HOD1]

The importance of contextualising practitioners' learning within a community of practice was raised by a HOD, as illustrated by the following comment:

> …most of what they (practitioners) do, they learn and respond through the interaction with the activity of their work. That does imply that they cannot do these alone. They need to be part of a community, a professional community what ever. They need to be accepted into that community and be allowed authentic practice. [HOD6]

Participating and interacting in a community of practice is part of professional networking. The educational framework adopted in the study supports the concept of community of practice and therefore serves to address the need identified here.

4.5.2 Refine Research Question 1

The need for practitioners to reflect in order to advance current workplace practices was highlighted in the data analysis. It is also through reflection that MRS practitioners can be empowered. Thus, Research Question 1 was modified to make explicit the need to assist participants to engage in reflection. In addition, given that the MRS workplace culture is one

that promotes conformity due to its adherence to protocol, the success of the online module in empowering participants is judged by the extent in which participants start to question and reflect and to 'think beyond the square'.

As a result, Research Question 1(a) was modified to include reflection and empowerment as the learning needs of the educational framework for CPD.

Original Research Question 1:

1 What are the design features of an educational framework needed for a CPD program to meet the current and future needs of the MRS profession?

(a) How effective is the online learning module, embedded within an educational framework, in addressing the current and future needs of the MRS profession?

Modified Research Question 1:

1 What are the design features of an educational framework needed for a CPD program to assist MRS practitioners, who are entrenched in a protocol-driven workplace culture, to engage in reflective practice?

(a) How effective is the online learning module, embedded within an educational framework, in:

(i) assisting MRS practitioners to develop a culture of reflective practice in their workplace?

(ii) empowering MRS practitioners to 'think beyond the square'?

4.6 First Research Phase: Conclusion

This section provides a summary of the findings from the First Research Phase, followed by an overview of the research questions.

4.6.1 Summary of Action Research Cycle 1 findings

In terms of the attributes that are essential for current and future practice, both MRS practitioners and HODs have ranked the attributes in a similar manner. Attributes relating to clinical performance were ranked as the most important, followed by continuing learning with attributes relating to workplace advancement ranked as least important. The low level of ranking for attributes relating to workplace advancement implies that MRS practitioners do not regard attributes such as initiating change and risk taking, high on their agenda. In addition, interview data identified MRS practitioners' low self-esteem and subservient mentality as major stumbling blocks to practitioners' ability to continue learning.

Data obtained from the CPD Survey showed that the majority of respondents perceived MRS practitioners to have a high level of professionalism. Of the four MRS disciplines, sonographers and radiation therapists were considered to have attained a higher level of professionalism than radiographers and nuclear medicine technologist. This perceived level of professionalism, however, is not matched by the level of public regard and the level of public knowledge of the MRS disciplines, with the MRS profession in general suffering from low profile and low level of public regard. Thus, despite the positive self-affirmation, the MRS profession is struggling to be recognised by other health professions and the public as a profession in its own right. These factors together with the dominance of the medical profession, apathy and poor self-esteem of practitioners, have a cumulative effect on MRS practitioners' ability to excel, constraining even the most willing and enthusiastic MRS practitioners to work only within set parameters. The prevailing workplace culture has effectively 'bound' the practitioners, preventing them from thinking beyond the square; the latter being an essential prerequisite for any health practitioners to excel beyond their current capacities. Thus, although MRS practitioners perceived themselves to have attained a high level of professionalism, the reality of the workplace situation, low self-esteem of MRS practitioners and the dominance of the medical profession are preventing MRS practitioners from delivering the best possible healthcare for patients.

Respondents ranked extrinsic rewards such as salary increment and promotion as one of the most important factors in motivating practitioners to continue learning. Although practitioners were participating in CPD, this was usually in the form of in-house training, workshops, seminars and self-directed study. Relatively few MRS practitioners were participating in formal studies conducted by universities due to the high cost and time commitment required with formal education. The lack of financial reward upon successful completion of studies was a major deterrent.

Reflecting on the data, four needs of the MRS profession were identified and these needs informed the researcher in the design of the CPD educational framework. These included reflection, empowerment of MRS practitioners, the need for CPD to have an impact on the workplace, and professional networking. Thus, Research Question 1 was modified to include reflection and empowerment of practitioners as one of the desired outcomes of the educational framework. One way of ensuring that learning in CPD would have an impact on the MRS workplace would be to include literature search and EBP as part of the learning activities in the online module. Incorporating the concept of a community of practice in the CPD educational framework would go towards assisting participants of the online module to contribute to professional networking. Moreover, participating and interacting in a community of practice is an effective form of professional development and benefits MRS practitioners, the profession and the MRS workplace.

Chapter 5 presents the Second Research Phase, and describes the implementation of the online module, learning outcomes and the evaluation of the online module.

4.6.2 Overview of research questions and source of data

The focus of the study is to assist MRS practitioners, embedded within a protocol driven workplace culture, to develop and engage in reflective practice via an online learning community. Table 4.11 presents the research questions, together with the sources of data that were used to address each question.

Table 4.11
Summary of sources of data that address the research questions

Research Questions		Answers
Research Question 1 What are the design features of an educational framework needed for a CPD program to assist MRS practitioners, who are entrenched in a protocol-driven workplace culture, to engage in reflective practice?		
(a)	How effective is the online learning module, embedded within an educational framework, in: (i) assisting MRS practitioners to develop a culture of reflective practice in their workplace? (ii) empowering MRS practitioners to 'think beyond the square'?	• 1st & 2nd pilot module
(b)	Is it possible to address the development of broader lifelong learning attributes, in addition to those that are clinically focused in the MRS profession, in an online learning module?	• 1st & 2nd pilot module
(c)	How does one balance the essential elements of an educationally sound online learning experience against the background of increasing financial constraints and technical infrastructure, and still have a program that is attractive to MRS practitioners and commercially viable for educational institutions?	• Literature review • 1st & 2nd pilot module
Research Question 2 According to practitioners and Heads of clinical Departments (HODs), what are the attributes required by practitioners to address the future needs of the MRS profession?		
(a)	What are the key attributes that assist practitioners in the performance of their current duties?	• CPD Survey • Interviews
(b)	What are the key attributes that will assist practitioners in the performance of their future duties?	• CPD Survey • Interviews
(c)	What, if any, are the differences in responses between practitioners and HODs?	• CPD Survey • Interviews
Research Question 3 What are MRS personal perceptions of themselves as professionals?		
(a)	What are practitioners' and HODs' perceptions of the MRS profession in relation to other health professions?	• CPD Survey • Interviews
(b)	How, if at all, do perceptions differ between practitioners and HODs?	• CPD Survey • Interviews
(c)	Does the level of perceptions of MRS professionalism impact on MRS practitioners' ability to deliver the best possible health care for our patients?	• CPD Survey • Interviews
Research Question 4 In terms of workplace culture, what are the factors that influence MRS practitioners' decisions to engage in CPD?		• CPD Survey • Interviews

Chapter 5

Second Research Phase: Implementation and evaluation of online module

5.1 Action Research Cycle 2: Refinement of the online module
5.2 Preparation for the online module
- 5.2.1 Embedding the online module in Radiation Therapy
- 5.2.2 Preparation of the researcher
- 5.2.3 Preparation of the Action Research Team
- 5.2.4 Operationalisation of the online module

5.3 Action Research Cycle 3: Implementation of 1st pilot module
- 5.3.1 Call for participants
- 5.3.2 1st pilot participants
- 5.3.3 Progress of 1st pilot module
- 5.3.4 Evaluation via Kirkpatrick's model, reflection and changes to 2nd pilot module

5.4 Action Research Cycle 4: Implementation of 2nd pilot module
- 5.4.1 Call for participants
- 5.4.2 2nd pilot participants
- 5.4.3 Progress of 2nd pilot module

5.5 Action Research Cycle 5: Evaluation of online module using Kirkpatrick's four level evaluation model
- 5.5.1 Level 1: Reaction data
- 5.5.2 Level 2: Learning data
- 5.5.3 Level 3: Behavioural data
- 5.5.4 Level 4: Impact data

5.6 Second Research Phase: Conclusion

This chapter focuses on the implementation of the 1st and 2nd pilot online module, forming the Second Research Phase of the study. Chapter 5 begins with an explanation of how findings of the First Research Phase were incorporated into the online module, reasons for embedding the online module within the radiation therapy discipline and the preparatory groundwork. It then details the implementation of the 1st pilot module, outcomes, evaluation and reflection on the 1st pilot, followed by the implementation of the 2nd pilot module, evaluation and the outcomes. The chapter concludes with a summary of the findings.

5.1 Action Research Cycle 2: Refinement of the online module

This section explains how data from the First Research Phase were used to inform the design of the online module.

The CPD educational framework is based on social constructivism, learner-centred learning, and situated learning, and used a course management software package to make possible the instructional frameworks of constructive alignment and Salmon's 5-stage model (see Chapter 2, Section 2.4.6). Four needs were identified from the First Research Phase, namely the need for practitioners to engage in reflective practice; to empower practitioners to move beyond the current constraints imposed by the medical profession; for CPD activities to have an impact on the workplace; and for professional networking within the MRS community (see Chapter 4, Section 4.5.1).

Data from the First Research Phase confirmed the literature review detailed in Chapter 2. The data substantiated the need to address the challenges currently confronting the MRS profession, namely, a protocol driven workplace culture that discourages critical thinking and reflection, low self-esteem, and medical dominance of the profession.

From the data, reflection has been identified as one of the major attributes that is currently lacking amongst MRS practitioners. Reflection holds the key to unlocking professionals' understanding of their practices, thereby enabling them to assume a more proactive role in their workplace and in advancing the profession (Serafini, 2002; Wesley & Buysse, 2001). Reflection also holds the key to empowerment. Encouraging participants to "reflect fruitfully upon practice" is one way in which a profession can assist its members, who are feeling increasingly less appreciated and with low self-esteem, to get re-connected to being a professional and to take pride in their work (Bolton, 2001, p.7). Thus, including reflection and empowerment as two of the main objectives of the online module addresses the first two needs of the MRS profession.

HODs interviewed also confirmed the need for CPD to impact on the workplace. Including literature search and EBP as part of the learning activities will enable participants of the online module to apply EBP approaches to their workplace practice, resulting in CPD learning that would have an impact on the MRS workplace. EBP also allows participants to reflect on their workplace practices and is therefore especially relevant for the MRS workplace culture that encourages conformity to practice (see Chapter 2, Section 2.4.6).

Thus, special attention has been paid towards designing activities that will result in tangible changes in the workplace. The researcher devoted the final four weeks of the 13-week online module to EBP activities. Participants are required to select an issue in their workplace. The researcher has opted for an EBP assignment instead of implementation of EBP proposals. This is because requiring participants to implement their proposals is impossible within a 4-week timeframe as the EBP proposal is designed to bring about changes in the workplace, and the proposal would first need to be reviewed by hospital committee(s) to assess the possible impact on patients. In addition, resources in the form of revenue and manpower may be required. Then there is the added consideration of possible political dynamics. Thus, making EBP implementation mandatory is impractical and may put participants in an untenable position (Action Research Meeting 1: 10 September 2003). By providing opportunities for participants to go through the EBP activities on paper, the assignment served as an introduction to future EBP projects in the workplace.

The educational framework adopted in the study supports professional networking online. Incorporating authentic learning activities and the concept of a community of practice as part of the educational framework is an effective form of CPD learning. Participating and interacting in a community of practice also provides opportunities for participants to function as members of community of practice, paving the way for participants to contribute towards professional networking online.

However, reflection must be contextualised in the participants' realm of experience and workplace (Boud & Walker, 1998). Thus, learning activities are based on the professional knowledge of practitioners. Another major objective of the online module is to consolidate and expand participants' clinical knowledge. Increasing and consolidating knowledge is one way of empowering practitioners, as the following comment illustrates:

> But to take the initiative, you have to have the confidence that you have got the knowledge. And that gets us back to the beginning, to get the knowledge, you have to do the reading, gee up the brain. It is something you have got to do, otherwise you can't talk confidently and you can't contribute confidently to any discussions about it. [HOD8]

Using the above data, the researcher designed an online module integrating all the above identified needs into the online module.

5.2 Preparation for the online module

This section details the preparation of the 1st and 2nd pilot online module. The researcher first explains how the online module was embedded in the radiation therapy discipline, before detailing the preparation of the researcher and the Action Research Team leading to the start of the online module.

5.2.1 Embedding the online module in Radiation Therapy

Given that participation in the online module was voluntary and there was no formal award upon completion of the module, one of the major concerns of the researcher was the ability of the participants to persevere till the end of the module. Thus, as part of the incentives, the researcher obtained approval from the Australian Institute of Radiography CPD officer that participants were able to claim 20 CPD credit points and receive a Certificate of Participation upon successful completion of the module.

Nevertheless, the temptation faced by participants to abandon the module midway, in the midst of their other commitments, was a distinct possibility. Thus, aside from ensuring that the activities of the online module were relevant, authentic and challenging, the researcher chose to embed the online module in the radiation therapy discipline. This is because recent developments within the radiation therapy profession have increased awareness amongst radiation therapists of the importance of CPD. First, Baume's report on the Radiation Oncology Inquiry (2002), pointed towards the need for the radiation therapy profession to work towards professional recognition, role expansion and CPD. The present study, focusing on CPD for MRS practitioners, was therefore a timely project for the radiation therapy profession. Second, when designing the online module in 2003, the proposed implementation of mandatory CPD for radiation therapists in 2004 (Baume, 2002) provided an added incentive for participants to complete the online module in 2004. Third, data gathered from interviews with radiation therapy HODs indicated an increasing demand by patients for radiation therapy centres to adopt the latest treatment methods, thus directing radiation therapists' attention to the importance of keeping up with radiation therapy literature, as the comment below illustrates:

> In radiation therapy, our customers are becoming more and more informed. We are asking people to make decisions when it comes to their health care, so we need to be

ourselves informed on what evidence exists to assist them in making the decision as well. [HOD4]

Fourth, the majority of radiation therapy departments are more proactive than medical imaging departments in promoting a learning culture, as evidenced by regular fortnightly in-house meetings, journal clubs and creation of posts for radiation therapy educators. In an effort to address the severe staff shortage in the radiation therapy workforce, CPD is currently the focus of the radiation therapy community. Radiation therapists are more likely to be more supportive of an online module that provides CPD.

5.2.2 Preparation of the researcher

As part of the preparation, the researcher completed three online modules in 2003, with the aim of experiencing online learning from the perspective of a learner. Two modules (called Module A and Module B here) were conducted as part of the Australian Technology Network Universities LEAP (Learning Employment Aptitudes Program) program. Students who enrolled in these modules are postgraduate students from the five Australian Technology Network universities. In general, the aim of the modules was to enhance students' employability skills, with skills ranging from leadership and communication, research commercialisation to entrepreneurship. Each module consisted of 30 students and ran for 10 weeks.

As the role of the moderator is essential in creating and maintaining a learning community, the researcher also completed a third module (Module C). This is a 5-week online module that was conducted in accordance to Salmon's 5-stage model of E-moderating. There were 16 participants, all with an academic background, from Australia, Italy, Malaysia, Singapore and United Kingdom. By completing Module C, the researcher aimed to acquire the necessary moderating skills and to experience being part of an online learning community.

From Module C, the researcher learned how participants support one another as members of a learning community, learned the skills of moderating and learned how an online module can be conducted and facilitated to bring about online learning that is engaging, motivating and collaborative. The learning and experience acquired from Module C contrasted sharply with the other two modules. Although both Module A and B also required students to post their contributions on the discussion forum, the lack of engagement as a cohesive learning

community made a major difference to the learning experience and learning outcomes of the researcher, in her capacity as a learner.

Module C was a good example of social constructivism and constructive alignment, with the emphasis on learners acquiring the skills of moderating. The importance of socialisation and the subsequent bonding that resulted was experienced and shared by all students in Module C, as the following comment illustrates:

> It [referring to the busy schedule] does throw me some thoughts, more particularly about re-engagement of students that drift away due to time demands. It would have been very easy to say, well I have learnt [sic] enough, I have got behind and it is too hard, too much effort required to catch up. What made me come back? My feeling of obligation and comraderie [sic] with the Red Group, a sense of belonging that has been developed? It was more social aspects than anything else, which once again stresses to me the importance of developing this early, to maintain student engagement throughout the course, even after periods of time out. [Module C: S1]

Another student reflected on the reasons why standard online courses failed to generate the camaraderie spirit, as illustrated by the following comment:

> In reflecting on this session, I am starting to see what 'went wrong' with the (uni) online course I am participant in. While we all did introductions, after that it fell flat. The intro exercise made sure we all could post messages, but did not set a solid foundation for future group work as it was a one off. [Module C: S6]

The researcher herself reflected on the reasons for the success of the learning community in Module C as follows:

> We are seeing a learning community in action now. I think the underlying key is that we are interacting beyond our “official” needs ie. acquiring of emoderating skills. As a group, we take an interest in what each other is doing, we empathize with Student 2 jetting around, rejoice with Student 1’s “new” nephew, Student 5’s lovely animal farm etc. etc. [Module C: the Researcher]

Reflecting on the lack of similar bonding in Module A and B, the researcher realised the importance of making explicit to the learners that it is each of their responsibility to create and foster a learning community, as the comment below illustrates:

> I think it is the student's responsibility only if they are made aware of the need to create and foster a learning community…Students may respond to one another's emails because it seems the right thing to do, or because they are expected to do so as part of the course requirement. They may not be actively pursuing the objective (of community feeling) but are actually supporting the learning/spirit in a more subtle way. By being upfront with that objective [of building a learning community], as you [the E-moderator] have done here, it makes all of us conscious of our responsibilities, we are openly supportive of one another… [Module C: the researcher]

The researcher also learned the importance of live chat in online learning. Live chat has the additional advantage of enabling learners to clarify their doubts and encapsulate their learning with their peers in a single session. Module B did not have live chat as part of the learning activities. Module A used live chat for the purpose of concluding each topic with a chat session. This also has the added benefit of getting learners better acquainted with one another, thereby further increasing the level of subsequent interactions. Having been through three online modules, the researcher is of the opinion that live chat is especially important if building an online learning community is not part of a module's objective. In Module C, participants were very interactive and supportive of one another and were thus able to do without any live chat sessions (although on their own accord, they met for two live chat sessions at the end of the Module C). However, in Module B, the absence of live chat presented missed opportunities for more learning to occur and for participants to know one another better.

So was Module B successful? Despite the lack of cohesiveness as a group, the researcher noted the successful outcomes of individual learners, evident from individual postings of students who completed the module. The researcher reflected on the 'success' of Module B in her reflective journal as follows:

> Students [of Module B], who persevered to the end, obviously have benefited from the participation. Even though the module has not operated in the way of creating and maintaining a supportive learning environment, I think the unit still has achieved its objectives of increasing students' knowledge, as those who worked hard have benefited from the reading and learning. So they have succeeded in terms of individual learning, but certainly not in terms of collaborative learning ie. building upon one's another knowledge and experiences as the exchanges were rather limited.
>
> [Researcher's reflective journal: 26th November 2003]

In fact Module B had some ‘heated exchanges’ between students of the different cultures, which the teacher of Module B had conveniently ignored. These exchanges had dampened the enthusiasm of some students in subsequent discussions, and might even have discouraged others from engaging more deeply in the exchanges that followed. The researcher felt that the learning in Module B was less effective as a consequence of the poorly facilitated discussions. As a result, the learning that might otherwise have occurred with the international cohort of students did not eventuate and only two-thirds (20 students) successfully completed the module.

While Module A and B provided the researcher with the typical online learning experience of being impersonal and frustrating, the learning and experience acquired through Module C provided the researcher with the expertise, experience and confidence that it is possible to design and foster online learning that is engaging, motivating and addictive. In the context of the present study, the importance of creating online learning that is engaging is underscored in the CPD Survey where 40% of respondents reported they had prior negative online learning experience and indicated the lack of engagement in online learning (see Appendix 5.1).

5.2.3 Preparation of the Action Research Team

As part of a collaborative approach in action research, an Action Research Team consisting of the researcher, a senior radiation therapy academic staff and two senior radiation therapists was formed. While the researcher assumed the role of designer and moderator of the module, the other three team members assumed the role of facilitating the online module. Together, the three facilitators served four main functions. First, the facilitators served as the content experts in the online module. Second, they provided the link between theory and practice by offering radiation therapy advice towards creating an authentic online learning environment. Third, they served as a reference group, validating the researcher’s actions thereby reducing researcher bias. Fourth, the three facilitators assumed the role of facilitators in the pilot modules, prompting and guiding participants in their discussions and providing feedback to their input on the discussion forums.

Of the three facilitators, the two senior practitioners also assumed the role of clinical educators in their clinical centres. Although all three team members have participated in online learning before, they were new to the role of facilitation. Only one facilitator had

participated in an online discussion forum. Even then, the same facilitator noted that the exchanges were sporadic and the module was certainly not conducted with the aim of fostering an online learning community.

Thus, in order to assist all three team members in preparing for their facilitation roles, the researcher:

- conducted regular meetings to update members on progress of the module preparation while also providing opportunities for members to seek clarification and for the researcher to seek input from members;
- recommended literature on online facilitation and moderating for members to read;
- discussed issues about the role of team members as facilitators, the extent of their presence at the discussion forum, and how best to support participants' learning;
- introduced Blackboard to two of the members who had no experience working with Blackboard and course management software;
- enabled team members to access Blackboard prior to module commencement for their familiarization with the online environment; and
- conducted three meetings via Blackboard live chats, thereby preparing team members for subsequent live chats with participants.

5.2.4 Operationalisation of the online module

The online module was piloted twice via action research as the 1st and 2nd pilot module. This section explains the operationalisation of the online module in detail, namely the learning aims, activities and learning outcomes, radiation therapy content, duration and schedule of the module and assessment and feedback.

Learning aims, activities and learning outcomes

There were three learning objectives for the online module; to enhance participants' ability to reflect and, in the process, empower participants, and to increase participants' clinical knowledge. In order to make reflection a meaningful activity, reflection must be contextualised within participants' social context. Thus, the participants were to reflect on their clinical knowledge and workplace practices. However, to avoid influencing or tainting participants' reflection of their learning outcomes, the researcher refrained from making

empowerment an explicit objective of the online module. As such, participants were only aware of two learning objectives: to enhance reflection and increase in clinical knowledge.

Learning activities are tasks that participants engage in to achieve the learning objectives. The learning activities participants were expected to undertake included:

- posing questions that address their workplace practices (the why, what and how);
- accessing and retrieving relevant information from multiple sources especially via the RMIT University electronic library database;
- reviewing and analysing information obtained;
- synthesising knowledge and experience in the workplace and professional practices;
- articulating, and sharing their understanding with their online peers;
- considering the big picture (through discussions of literature reading and exchanges with their online peers on various issues);
- reflecting on individual and collective learning; and
- participating in a mini trial run of evidence-based practice.

Upon successful completion of the module, participants were expected to be able to:

- apply their knowledge more effectively in the workplace by engaging in reflective practice;
- understand evidence-based practice in the context of radiation therapy;
- use information literacy skills to further enhance their workplace learning;
- articulate and share their knowledge with their peers;
- communicate effectively online; and
- be an effective member of an online learning community.

Radiation therapy content

In terms of radiation therapy content, the Action Research Team decided to focus on breast planning in radiation therapy. There were three topics to the theme, namely: the role of radiation therapy in the management of breast cancer, current planning practices for breast cancer, and tattoos and skin marks.

The Action Research Team chose the breast planning for several reasons (Action Research Meeting 2, 7 October 2003). First, radiation therapy planning forms 50% of the workload in

most radiation therapy centres and is therefore a subject all radiation therapists are familiar with. Second, planning is a technical subject, which will provide the 'substance' for discussion as practitioners favour technical issues. Third, planning is an area that has wide diversity and varied approaches, with different centres adopting different treatment techniques. Such a varied topic would certainly stimulate exchanges in the discussion forum. Fourth, breast cancer is also one of the most difficult areas to prepare a good treatment plan. Hence, breast planning is an area that comes under the direct supervision of oncologists. It is therefore common for radiation therapists to adopt breast treatment protocols without understanding the rationale. Thus, requiring participants to share and justify their workplace protocols would provide the trigger for reflection.

Duration and schedule of the online module

In order to cultivate and promote a spirit of a learning community, an online module that runs for a longer duration with fewer hours of commitment per week will have a better chance of success as opposed to a module that lasts for a shorter duration but with more hours per week. This is because given the busy life style of working adults, fewer hours per week is a more viable option. As the educational framework is expected to operate within a typical university environment, it was decided that the module would run for the length of a semester of thirteen weeks, which is a common length of a teaching semester.

The three topics were spread over 13 weeks (see Table 5.1). The researcher, assuming the role of the moderator, facilitated the first two weeks and the final week of the module. With the exception of EBP activities, each facilitator was responsible for facilitating a topic (see Table 5.1). Briefly, the facilitators' role is to guide and extend the discussions, facilitate learners' learning by providing timely feedback, suggest learning resources and encourage participants to reflect on their work (see Chapter 2, Section 2.4.5). As the moderator of the online module, the researcher was responsible for overseeing all aspects of the online module, ensuring that all participants contributed regularly to the learning community and leaving the radiation therapy discussions to the three radiation therapy facilitators.

Learning activities

The learning activities in the online module were based on Salmon's five-stage framework (Salmon, 2002a). The aim of the framework is to create and maintain a structured, safe and supportive learning environment that allows participants to advance their learning online

incrementally. The five-stage framework was modified and applied to the present study. Table 5.2 provides a summary of the learning activities.

Table 5.1
Schedule of the online module

Week	Topics	Facilitator(s)
Week 1	Getting to know one another	Moderator & Team
Week 2	Professional networking	Moderator & Team
Week 3 Week 4	Role of radiation therapy in the management of breast cancer	Facilitator 3
Week 5 Week 6	Current planning practices for breast cancer	Facilitator 2
Week 7 Week 8	Tattoos or skin marks?	Facilitator 1
Week 9 Week 10 Week 11 Week 12	Applying evidence-based practice in Radiation Therapy	Facilitator 1 Facilitator 2 Facilitator 3
Week 13	Final reflection and celebration!	Moderator & Team

Table 5.2
Summary of learning activities in online module

Week	Topics	Learning activities
1	Getting to know one another	Self-introduction Sharing workplace and prior online learning experience Reflecting on Week 1 learning
2	Professional networking	Sharing motivation about learning Reading, reflecting and responding to reflection literature Sharing about reflection in the MRS workplace Reflecting on Week 2 learning
3 4	Role of radiation therapy in the management of breast cancer	Information exchange: Sharing workplace protocols: why, what & how Knowledge construction: Literature search Sharing of recommended literature Reflecting on each topic learning
5 6	Current planning practices for breast cancer	
7 8	Tattoos or skin marks?	
9 10 11 12	Appling EBP in radiation therapy	Reading, reflecting and responding to EBP literature Selecting EBP topic EBP assignment Sharing EBP assignment
13	Final reflection and celebration!	Reflecting on EBP learning Reflecting on 13 week of learning

Week 1: Getting to know one another (Stage 1)

The first week focused on participants getting acquainted with their online peers and navigating their way around the Blackboard environment. Participants were required to post messages to the discussion forum, introducing themselves, describing their workplaces and types of treatment machines in their centres, sharing their prior online experience (if any) and their expectations from participating in the module. The week ended with participants reflecting on their experience in the first week.

Week 2: Professional networking (Stage 2)

The second week aimed to consolidate the acquaintance established in Week 1. Participants were required to post a message about their motivation to learn, their understanding of reflections prior to and after reading the nominated literature on reflection, reflecting on reflection in their workplace and then ending the week with reflecting on their second week of learning.

Week 4 to Week 8: Information exchange and knowledge construction (Stage 3 and Stage 4)

There were three radiation therapy topics in total. Each topic consisted of two phases of activity, information exchange and knowledge construction. Information exchange involved participants sharing their workplace protocols, explaining the what, why and how. The aim of this activity was to first provide opportunity for participants to recollect accurately their workplace practices. Boud et al. (1985) called this first stage the “returning to experience’. Here, participants were also expected to articulate their justification for what they did. This stage formed the information exchange phase and resulted in widening of participants’ perspectives.

The second phase involved knowledge construction and focused on building and expanding on participants’ existing radiation therapy knowledge. The first activity involved participants in reading, reflecting and responding to a nominated article recommended by one of the facilitators. The second activity required each participant to perform a search on the electronic library database, with the aim of recommending an article for his/her peers to read. They were to indicate in their postings their reasons for recommending the articles.

This form of collaborative learning is especially valuable in this context whereby time is a major constraint. In a class of 12, by simply doing one search, each participant would have access to 11 additional articles. These activities also provided opportunities for participants to advance their information literacy skills. Reflection is promoted by setting aside time specifically for participants to reflect on literature with various reflection aids such as reflection prompts, reflection examples and support from the facilitators (Boud et al., 1985). By sharing their individual reflections with other online peers at the discussion forum, participants will go through various phases of the reflective process as described in the third stage (re-evaluating experience) of Boud et al.'s reflective model. These include association, integration, validation and appropriation and possibly some reflection outcomes (Boud et al., 1985).

At the end of each topic, each participant posted his/her personal reflections. The second stage of reflective model, attending to feelings, is most likely to surface during the final reflection of each topic, with participants looking back and reflecting upon their learning. In addition, all participants were encouraged to put together a summary of their group's learning. The aim of this activity was to provide participants with ownership of their learning. Having them articulate their learning outcomes also allowed the researcher to understand the type of learning that had occurred.

Week 9 to Week 12: Evidence based practice in Radiation Therapy (Stage 5)

The final four weeks (Stage 5) of the module enabled participants to put their reflection and information literacy skills into practice by applying EBP at their workplace. The EBP activity was planned with the aim of enabling participants to see how their newly acquired skills can be successfully applied in the workplace. As part of the learning community, participants were encouraged to rely on their online peers as a resource and ongoing support.

The EBP activities lasted for four weeks. In the first week participants shared their understanding of EBP prior to and after reading the recommended EBP literature (the 3R exercise). In the second EBP week, each participant selected his/her own clinical issue for investigation. They then posted their clinical issues and brainstormed their selected topics with their online peers and facilitators. As discussed in Section 5.1, due to workplace constraints, participants' EBP outcomes were in the form of an EBP assignment (not exceeding 3000 words).

There were two parts to the assignment; the first part consisted of literature review and the second part referred to the implementation of his/her EBP proposal. Due to time constraints, critiquing and reflecting on the literature was limited to one article. This was done with the acknowledgment that one article was grossly inadequate but a comprehensive review of the literature was not realistic. The EBP activity was therefore set up with the aim of giving each participant a limited EBP experience rather than aiming to be a comprehensive exercise. The second part of the assignment required the participant to identify the obstacles likely to be encountered in the implementation of his/her proposal and the corresponding strategies to overcome these obstacles. Encouraging participants to look beyond radiation therapy content enabled them to appreciate how other factors might prevent a good idea from succeeding, thereby assisting participants to adopt the 'big picture' approach, an attribute that HODs considered to be lacking in MRS practitioners.

The fourth EBP week was devoted to the dissemination of EBP work. Each participant was required to post a summary of his/her EBP assignment and the reference list. Posting of their entire EBP assignment was optional. It was felt that making sharing of EBP assignment in its entirety mandatory might be seen by some as intrusive. In addition, making 'public' the second part of the EBP assignment, whereby participants were required to identify the possible obstacles encountered in their workplace, might not be appropriate in some instances.

Week 13: Final reflection, celebration and farewell

During the final week of the module, participants were required to make two postings; one reflecting on their EBP activities and another reflecting on their 13-week participation in the module. The final activity involved a virtual celebration party; with participants coming together to bid each other farewell.

Figure 5.1 presents the design features of the online module.

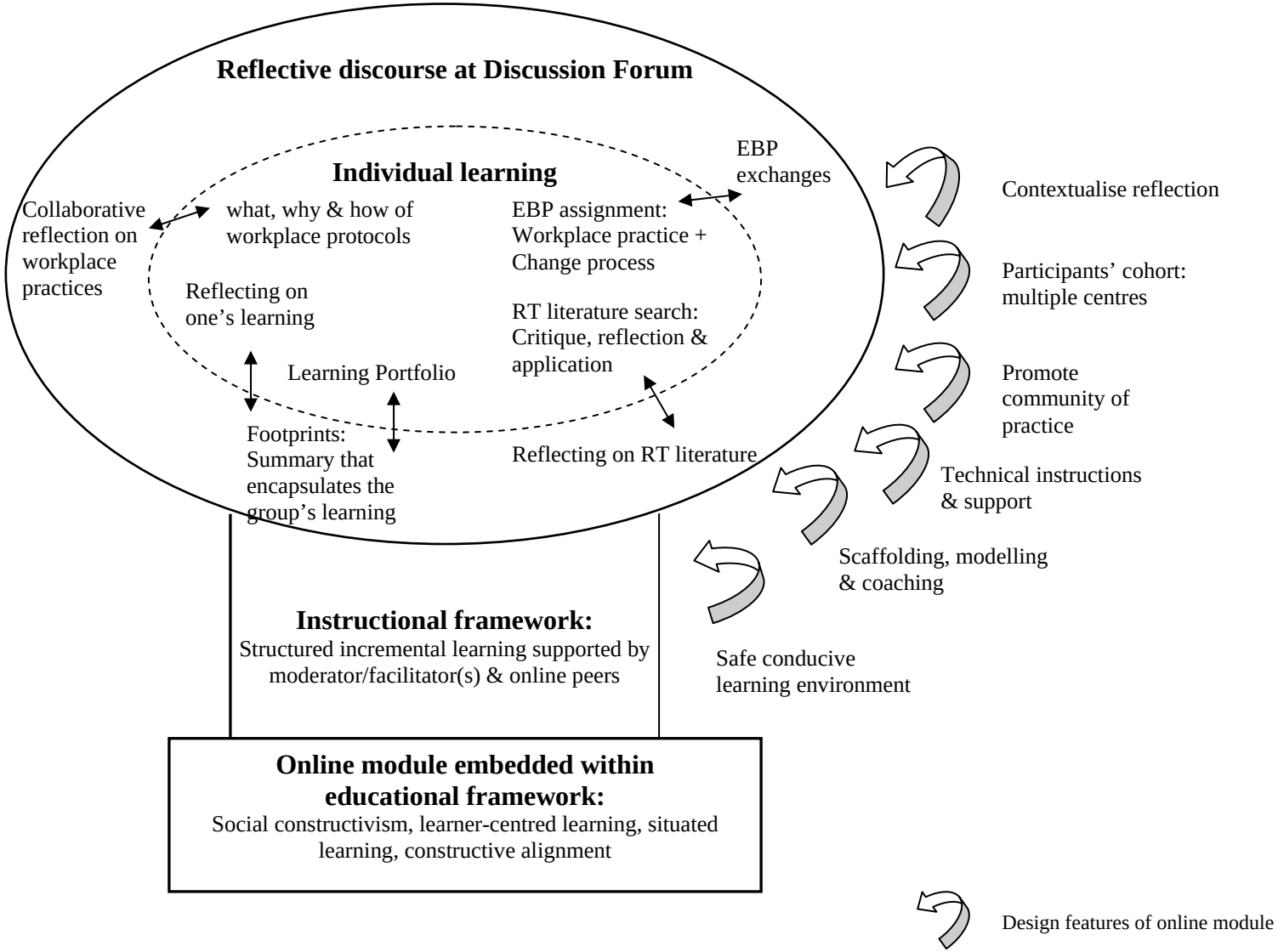

Figure 5.1

Design features of the online module

Responsibilities of participants

The researcher was explicit in laying out the roles of the moderator and facilitators as well as the responsibilities of participants. In order to be awarded the Certificate of Participation (see Appendix 5.2) and be eligible for the 20 CPD credits from the Australian Institute of Radiography, participants were expected to:

- participate actively in the discussion forums (each topic had a minimum number of activities to complete);
- complete their weekly reflections (which formed their learning portfolio);
- complete an EBP assignment; and
- compile and complete a learning portfolio.

In addition, participants were also encouraged to login on a regular basis, preferably two to three times per week, as opposed to one single session of three hours per week. As the learning activities required participants to read and respond to their peers' messages, visiting the discussion forum regularly would enable participants to communicate with their online peers.

Checklists and learning portfolio templates

To assist participants in keeping track of their learning, the researcher provided a checklist for each of the topics (see Table 5.3). In addition, a learning portfolio template (see Table 5.4) was also made available to help participants in putting together the learning portfolio.

Assessment and feedback

As the module formed part of the researcher's doctoral study and not part of RMIT University formal curriculum, there was no formal grading of participants' work. Rather, feedback was provided in the form of peers' and facilitators' comments and responses at the discussion forum. According to Kulik (1980 cited in Gibbs and Simpson, 2005), prompt, specific and constructive feedback provided regularly throughout the course is essential in improving student performance. As each participant was required to submit an EBP assignment, they each received detailed feedback from a facilitator, indicating their strengths and areas for improvement.

Table 5.3
Example of a checklist template

Week 5 & Week 6 Current planning practices for breast cancer					
Learning activity	**Activities to take place at:**	**Posted message to Discussion Forum**	**Posted at least one question**	**Posted response(s) to Discussion Forum**	**Description of activities**
5.1	Discussion Forum	Yes	-	Yes	Information sharing
5.2	Discussion Forum	Yes	Yes	Yes	3R: read, reflect & respond
6.1	Discussion Forum	Yes	-	Yes	Knowledge building
6.2	Personal reflection Learning Portfolio	Yes	-	Yes	Reflecting on Week 5 & 6 'Copy & paste' your reflections on the 5th & 6th week. Feel free to add any thoughts you may have as you move along the 13-week period
6.3	Discussion Forum	Edit & comment on the draft footprint	Putting together Footprints for Week 5 & 6		
	Learning Portfolio				Have you learned anything valuable in putting together this Footprint?

Table 5.4
Example of a learning portfolio template

Week 1 Getting to know one another			
Learning Activity	**Topic**	**Your postings on Discussion Forum**	**Additional thoughts**
1.4	Expectations for this module		Date posted:
1.5	Reflecting on Week 1		Date posted:

5.3 Action Research Cycle 3: Implementation of 1st pilot module

The 1st pilot module commenced on the 26th March and finished on the 25th June 2004. In terms of workload management, to assist the facilitators in managing the discussion forum postings and assignment marking, it was decided to restrict the number of participants for the 1st pilot module to 12 and to limit participants from the states of Victoria and Tasmania only.

5.3.1 Call for participants

Invitations were sent to seven major radiation therapy centres in Victoria and Tasmania for interested radiation therapists to enrol in the 1st pilot module. No pre-requisites were required for participation in this module. The only requirements specified in the publicity flyers were that interested practitioners:

- have access to a computer and the Internet;
- have the curiosity, motivation and a willingness to share their work experience, knowledge and thoughts online;
- be able to spend approximately 3-hours per week on the module; and
- have the desire to complete the full 13 weeks of the module.

Letters and flyers were sent to the Heads of Clinical Departments seeking their support in encouraging their staff to participate in the module (see Appendices 5.3 and 5.4). Following the letter, contacts via emails and phone were made with the clinical educators of the respective centres, requesting expressions of interest. Some radiation therapy centres have between two to five satellite branches. In this instance, the facilitators recommended that each branch be considered a 'separate' centre.

As the researcher and the facilitators were uncertain of the level of response, it was decided that selection for the 1st pilot would be based on a first come first serve basis and limited to one participant from each centre. A total of 47 radiation therapists from the seven major centres and two satellite branches indicated interest in participating in the 1st pilot module. Thus, based on the first come first serve basis, a total of nine radiation therapists was selected from the above seven centres and two branches. Given the level of interest shown by three major centres, an additional participant was accepted from each of these three centres, bringing the total to 12 participants.

A letter explaining the research study and the 1st pilot module, together with a consent form to participate in the study were sent to the 12 participants (see Appendices 5.5 and 5.6). Upon receipt of the signed consent, the researcher then initiated the process of enabling participants to gain access to RMIT secured websites such as the Blackboard, electronic library database and email system.

5.3.2 1st pilot participants

Twelve female practitioners volunteered for the 1st pilot module. As shown in Table 5.5, a third of the participants were above 50 years of age, with another third between 20- 29 years. The other one-third was evenly spread between the 30s and 40s age group. In the 1st pilot module, there was representation of practitioners from all ages.

In terms of years of practice, 33.3% of participants had more than 20 years of RT experience with 16.7% less than 5 years of experience and the rest rather evenly spread throughout the years. With the exception of two participants who were also radiation therapy educators, all participants were practitioners with radiation therapy planning experience.

Table 5.5
Demographics of 1st pilot participants[a]

	Age group			
	20-29	**30-39**	**40-49**	**50+**
Percentage	33.3	16.7	16.7	33.3
	Number of years of radiation therapy experience			
	Less than 5	**5-10**	**10-19**	**20+**
Percentage	16.7	25	25	33.3

[a]*n* = 14.

One-third of the participants had prior online learning experience. The online activities that participants were most comfortable with were receiving and sending emails and writing a word document using a word processor. However, in terms of skill level, even these two online activities were rated by participants as only slightly above average (1 being very low and 4 very high). Participants rated their level of skills in all other online activities including electronic database and online discussion forums as below average (see Table 5.6).

Table 5.6
Online experience of 1st pilot participants[a]

Description of online activities	**Skill level**	
	Average[a]	***SD***
Using a word processor to write a document	3.33	1.15
Receiving and sending email messages	3.50	1.17
Using electronic databases to search for information	2.67	1.37
Using online activities for your own personal or professional development	2.58	1.56
Communicating online via discussion forum &/or chat rooms	1.67	1.87

[a]*n* = 12.

Preparation of participants for 1st pilot module

Since the majority of participants did not rate themselves highly in terms of their online experience, the researcher adopted two strategies in assisting participants to get ready for the module. First, the researcher made the module accessible one week earlier than the official start date. This early start gave participants more time to familiarise themselves with the learning environment. It also allowed the researcher to tackle any unforeseen technical hitches.

The second strategy involved compiling a resource folder, *Online Module Resource folder*, which was sent to participants two weeks prior to the official start of the module. The aim of this folder was to allow participants to read instructions and access essential reading materials without having to log online. The folder consisted of five sections: 'Introduction', 'Navigating your way around RMIT online', 'About the online module' (such as learning objectives and schedule), 'Resources for online activities' (including examples for completion of online activities) and 'Additional information' such as net etiquette, search strategies and Harvard referencing style (see Appendix 5.7).

Consideration was given to conducting a face-to-face introductory session to assist participants to familiarise with RMIT websites. However, this idea was abandoned at the advice of the facilitators. First, with the current shortage of manpower in radiation therapy centres, it was highly unlikely participants would be given time off to attend a half day session. Second, with at least six participants coming from regional centres, even if it were possible to take time off, it would be a very costly exercise for participants to congregate in Melbourne. Participants who were unable to attend the sessions are likely to feel disadvantaged. Moreover, of the remaining six participants who were likely to be able to attend, two participants had prior online learning experience. Thus, it was deemed appropriate to do away with the introductory hands-on session, relying instead on written instructions provided in the resource folder.

5.3.3 Progress of 1st pilot module

Of the 12 participants who started, seven participants successfully completed the module, giving a completion rate of 58.3%. The most common reason for failing to complete the 1st

pilot module was due to unexpected increased workload in the workplace resulting in lack of free time to access the online module.

Problems encountered during 1st pilot module were essentially due to participants' limited online skills. Considerable time was spent on assisting participants with some basic word processing skills such as saving a template, how to copy and paste and how to attach and send an electronic attachment. In response to participants' requests, additional help was also provided on how to conduct literature search on an electronic database. The researcher also noted that on some occasions, participants were skimping over a few learning activities due to time constraints. In such instances, the researcher, in her capacity as the moderator, reminded and encouraged participants, offering help to assist them in completing the activities.

5.3.4 Evaluation via Kirkpatrick's model, reflection and changes to 2nd pilot module

With the completion of the 1st pilot module, the study is at the end of Action Research Cycle 3 (see Figure 3.1). Evaluation of the 1st pilot module was via Kirkpatrick's evaluation model, using feedback from 1st pilot participants, suggestions from facilitators and reflections by the researcher. Based on the above, changes were then made to the 2nd pilot module.

Kirkpatrick provides an evaluation model for an effective framework for assessing CPD programs (see Chapter 2, Section 2.5.3). Table 5.7 shows the data collection strategies for Kirkpatrick's model. Given that the 1st pilot module ended on the 25th June and the 2nd pilot module commenced on the 2nd August 2004, it follows that only Level 1 and Level 2 data were available to inform the researcher about the 1st pilot module. This is because of the delayed nature of Level 3 data and Level 4 data. The researcher received the EBP assignments in July/August from the facilitators, by which time the 2nd pilot module was already 'live' for early access by 2nd pilot participants. The Workplace Survey, which was completed by workplace supervisors, arrived in August and participants' learning portfolios were also received in August. The 3-month survey was not due till September of 2004. Thus, for the purpose of improving the 2nd pilot module, only Level 1 and Level 2 data were used. Specifically, the researcher relied on the mid and post module survey and messages posted on the discussion forum. Level 2 content analysis data, and Level 3 and Level 4 data of the 1st pilot module will be examined together with the 2nd pilot data in Section 5.5.

Table 5.7
Kirkpatrick's four level evaluation model and corresponding data collection strategies

Evaluation level		Data collection strategies
1	Reaction data	Mid module survey Post module survey Messages posted at discussion forum
2	Learning data	Pre-module survey and Post module survey Content analysis of reflection postings via Boud et al framework Content analysis of other learning outcomes via learning objectives of online module Facilitators' reflective journals Participants' learning portfolio
3	Behavioural data	Workplace survey (to be completed by Supervisor) EBP assignment assessment Messages posted at discussion forum 3-month post module survey
4	Impact data	Workplace survey 3-month post module survey Learning portfolio of participants Continuing communication with participants

Source: Adapted from (Kirkpatrick, 1996; Kirkpatrick, 1998)

Level 1 (reaction data) refers to how participants react to the module and thus focuses on the affective aspects of participants learning (Naugle, Naugle, & Naugle, 2000; Winfrey, 1999). Understanding participants' reaction to the module is important as negative feelings discourage participants from learning while positive feelings motivate participants not only to continue learning but it will also better prepare them to cope with any difficulties encountered (Baskin, 2001; Boud et al., 1985). Learners' positive affective reaction often results in better academic learning (de la Harpe, 1998).

Guskey (2000) lists three types of questions - content, process and context – that are essential in determining participants' reactions to a professional development program. Content questions aim to establish the relevance and timing of program content. Process questions refer to the format of the program including the quality of the presenters while context questions pertain to the learning environment (Guskey, 2000). Data at this level is collected by post module survey (Guskey, 2000; Long, 1999) (see Appendix 5.8). However, some of the context questions, such as technical issues, were asked during the mid-module survey (see Appendix 5.9). This enabled the researcher to tackle any unforseen problems rather than waiting till the end of the module.

Table 5.8 presents the 1st pilot participants' reaction to the online module, measured on a 5-point Likert scale of 1, strongly disagree, to 5, strongly agree. Only participants who have

successfully completed the 1st pilot are included here for analysis. In terms of content, 1st pilot participants agreed that the radiation therapy content and EBP activities were relevant to their professional responsibilities and their understanding of topics were also enhanced. They enjoyed the module and that the time spent with the module was worthwhile.

In terms of process, the quality of support provided by the facilitators, resources and examples were rated as well above average. As shown in Table 5.8, the time factor was the only issue that was rated a lower means score. The challenge of finding sufficient time to engage fully in the online activities was expressed also by participants in the discussion forum, as illustrated by the following comment:

> Sadly I did not contribute to the footprints. By the time I had done what had to be done there was little time for anything else. The course I thought was long, I was not prepared for that degree of commitment [sic] and continually felt I had not given it my best. I worked to a time frame rather than the task itself. [P7: 1st Pilot]

Table 5.8
Level 1 data of 1st pilot participants

Learning outcomes	1st Pilot[a]	
	Mean	**SD**
Content		
The RT topics were relevant to my professional responsibilities	4.71	0.49
My understanding of the topics was enhanced	4.00	0.00
The EBP activities were relevant to my professional responsibilities	4.43	0.53
My time spent in this online module was worthwhile	4.43	0.53
I enjoyed participating in this module	4.57	0.79
I would enrol in a similar format of online forum discussion module	3.71	1.80
I would recommend this module to my colleagues	4.57	0.53
Process		
The instructions for the activities are clear	4.43	0.53
The prompts provided by the facilitators are helpful	4.43	0.53
The feedback provided by the facilitators is helpful	4.43	0.53
The learning resources examples provided are useful	4.29	0.49
There is sufficient time allocated for each learning activity	3.43	1.27
Context		
You are able to access RMIT Blackboard without difficulty	4.14	0.90
The online discussions provided opportunities for my reflection	3.86	0.90
Exchanges at the Discussion Forum stimulated more exploration of issues than would be possible with individual learning	3.86	1.07

[a] n=7

Despite the limited online skills of participants, they did not report any difficulties in accessing Blackboard. The use of a discussion form as a means of supporting reflection and collaborative learning both received relatively lower mean scores, perhaps a reflection of

participants' unfamiliarity with reflection and collaborative learning as learning strategies (see Table 5.8).

Throughout the 1st pilot module, while encouraging participants to contribute and engage in the discussions, the researcher was also monitoring the discussions for suggestions that could lead to improvement of the 2nd pilot module. Overall, postings on the discussion forum were overwhelmingly positive, validating that the researcher was on the right track in terms of the design of the online module.

The researcher's concern that participants might see the first two weeks of activities as frivolous was put to rest when participants indicated the value of the 1st two weeks of activities in getting them ready for subsequent discussions. This affirmed that there was an appropriate mix of activities of socialisation, sharing of radiation therapy workplace, motivation about their learning, and reflecting on reflection, as the following comments illustrate:

> In fact the format [Week 1 activities] is such that it is relatively easy, just a bit time consuming…but I am getting to know my way around which is the object of the exercise. I think that the activities are quite well chosen to get us confident with the system. [P4: 1st Pilot]

> The discussions for the last 2 wks [referring to first two weeks] were good. It seemed like we started to get into the real stuff. Looking forwards to finding out how we plan breast patient between different centre. [P12: 1st Pilot]

The format of information exchange, whereby participants shared their knowledge and understanding of the topic to be discussed before engaging in the 3Rs activity of reading, reflecting and responding was validated by participants to be extremely useful, as the following comment illustrates:

> I like the structure of the exercises. First, testing what we believe we know what reflection is and then reading to find out what it is. [P12: 1st Pilot]

They also enjoyed the exchanges and discussion of workplace practices, as illustrated by the following comments:

> I also have enjoyed swapping info [information] about techniques and articles. [P8: 1st Pilot]

> I am really enjoying the ongoing discussion. It is very nice to have this enviroment [sic] to discuss technical matters with the peer group. I found it is very useful and I get a great value out of all this. It is well worth enrolling in doing this. [P12: 1st Pilot]

In summary, Level 1 data was encouraging, with participants reporting positive affective reaction, and did not indicate any major changes in terms of content, process and context were warranted.

Level 2 (learning data) refers to the type and extent of participants' learning. It is about evaluating the amount of "knowledge acquired, skills improved, or attitudes changed due to training" (Kirkpatrick, 1996, p56).In terms of content assessment, the usual approach is to conduct pre and post-test assessments (Long, 1999; Winfrey, 1999). However, due to the voluntary nature of this study, no formal pre or post-test was conducted. Rather, multiple data collection strategies were adopted to measure/determine the extent of learning that had occurred.

Table 5.9
Level 2 data of 1st pilot participants[a]

Learning outcomes	Participants' postings indicating successful learning outcomes	
	Count	**%**
Enjoyed exchanges at discussion forum	7	100
Shared learning with colleagues	6	85.7
Increased confidence as self-directed learner	5	71.4
Ability to retrieve articles	4	57.1
Acquired online learning skills	4	57.1
Ability to review literature	4	57.1
Increased in radiation therapy knowledge	3	42.7
Understand EBP in radiation therapy context	2	28.6

[a]n=7

In this instance, a count of participants' learning outcomes, as expressed by participants in the discussion forum was adopted. Repeated statements about the same learning outcomes were coded only once (see Section 5.5.3 for detailed explanation of methodology). As shown in Table 5.9, participants' learning included ability to conduct literature search, ability to review articles, increased in radiation therapy knowledge, and increased understanding of EBP in the radiation therapy context.

Participants commented that literature search was time consuming but they also confirmed the benefits of the activity, as illustrated in the following comments:

> I never thought I would get to 4.2, got stuck on trying to find an article. However I have gained a great deal from the experience, not only finding my way around data bases but from my readings. [P7: 1st Pilot]

> Learning how to do a literature search on the net and then finding something in those thousands of articles that may be of interest to others is quite a battle…I am looking forward to further searching and hope to present at our fortnightly in-service something of interest. I have learnt a lot. [P2: 1st Pilot]

> I found I've spent so much time searching for articles and reading them. This made me aware of many issues relating to not only patients physical effect but also mental effect after diagnosed, treated with surgery/chemo and or radiotherapy…There are so much to learn from. [P12: 1st Pilot]

Overall, participants' reflection on their learning experience for the 1st pilot module was positive, with the level of support provided by the facilitators and peers crucial in their learning, as the following reflection illustrates:

> When I decided to participate in this module I was unsure of my abilities to keep up with everyone and to even finish the module. I had limited computer skills or so I thought but was eager to learn more. I have found the module easier than I expected and thanks to the excellent guiding skills of our tutors [the moderator, Fac1 and Fac2] and to the wonderful honesty of you all I have been encouraged to explore where I haven't been before and broaden my perspective on radiation therapy. I have been toying with the idea of doing further study and will certainly look into this. I have sometimes struggled with having the time to complete our objectives due to family and work commitments but this has got easier as the weeks went on. I am sure my participation will be of benefit both to myself and our department and thanks to my new acquired abilities I have greater confidence in myself. [P2: 1st Pilot]

While the above data did not indicate any major changes for the 2nd pilot module, minor changes were made based on facilitators' suggestions and reflections by the researcher. These changes included increasing the level of assistance for literature search activities, modifying activities in the Week 1 and Week 2 and changing the duration of time spent on two of the three radiation therapy topics.

Postings from the discussion forum showed the level of difficulties experienced by participants during their first attempt at literature search. Thus, in addition to the instructions on how to conduct literature search provided in the 1st pilot module, the researcher decided to create specific examples on how to use Boolean operators to search for radiation therapy articles. All online instructions created in response to 1st pilot participants requests were made available in the resource folder also, *Online Module Resource folder*, for the 2nd pilot participants. The availability of the step-by-step instructions, prior to the commencement of the module, had the effect of reassuring and assisting participants who were new to online learning the confidence to move forward.

Another change to the 2nd pilot module was making participants' profile submission mandatory. In the 1st pilot module, to avoid over burdening participants in Week 1, the researcher refrained from making profile submissions mandatory. Thus, in the 1st pilot module, only two participants submitted their profiles. As a consequence, the 1st pilot participants complained of the difficulty of remembering 'who's who' and the problem of scrolling through the introductory postings in the discussion forum to re-read participants' introduction. One participant also suggested making the attachment of a photo mandatory in order to enable participants, most of whom are new to online learning, to learn how to send electronic attachments earlier. It is hoped that knowing how to send electronic attachments will encourage participants to attach photos during subsequent radiation therapy discussions. Thus, in the 2nd pilot module, profile submission was combined with Activity 1.3 in Week 1. Instead of merely sending a private email to the researcher, participants in the 2nd pilot module were required to send profiles of themselves and an electronic attachment.

There were altogether five activities in Week 2. On reflection, five activities in Week 2 may appear rather daunting especially to participants who are new to online learning and have not participated in CPD activities for a long time. Thus, there was a need to reduce the number of Week 2 activities. Hence, the prompt on the frequency of visit (which was Activity 2.4 in 1st pilot module) was replaced with an announcement, thereby reducing the number of activities in Week 2, from five to four.

In the 1st pilot module, six weeks were equally divided between the three topics. Evaluation of the 1st pilot postings during these six weeks showed that for the 2nd topic, 'Current planning practices for breast cancer', participants' discussions were continuing well into the 2nd week

of the 3rd topic, 'Tattoos or skin marks?' This was because planning practices is a complex issue that is of major interest to practitioners, while the topic of tattoos, although controversial, was relatively limited in nature. The facilitators suggested extending the 2nd topic from two weeks to three to allow for further discussions and reducing the 3rd topic to one week. In addition, the literature search for 3rd topic was removed to accommodate for the shorter time frame.

From the 1st pilot module, the researcher compiled a pool of 'Frequently Asked Questions'. Although this approach may seem impersonal, the researcher felt that the 2nd pilot participants might feel reassured knowing that the 1st pilot participants had experienced the same problems.

Feedback from participants in the 1st pilot on how to succeed in the 2nd pilot module, including suggestions on time management, logging patterns, and self-directed learning were made available in the *Online Module Resource Folder*. Participants' comments on what they liked about the 1st pilot module were also provided for the 2nd pilot participants to read.

5.4 Action Research Cycle 4: Implementation of 2nd pilot module

The 2nd pilot module started on the 2nd August and finished on the 14th November 2004. In order to spread the learning benefits to more centres, the researcher intended to make the 2nd pilot module available to radiation therapy centres across Australia.

5.4.1 Call for participants

The researcher took advantage of the 2004 National Australian Institute of Radiography Conference in Cairns, Queensland, to publicise the 2nd pilot module. As a result of the presentation, two clinical educators, one from New Zealand and another from Canada, requested that their staff be allowed to participate in the study. As internationalisation is high on the Higher Education agenda, the researcher saw this as an opportunity to give the online module an international dimension. With the inclusion of radiation therapists from New Zealand and Canada, the researcher was able to determine if the inclusion of international participants has in any way changed the dynamics at the discussion forum. A total of 27

expressions of interest were received as a result of the presentation at the Conference with 11 from New Zealand, six from Canada and 10 from various states across Australia.

For the 2nd pilot module, the researcher did not send any publicity letters to radiation therapy centres in Australia. This is because 23 radiation therapists who put forward their names for the 1st pilot module had expressed interest in participating in the 2nd pilot module. Together with the 10 expressions of interest received during the Conference, Australian expressions of interest already totalled 33, making any publicity call unnecessary. With the 17 expressions of interest from Canada and New Zealand, a total of 50 radiation therapists were interested in participating in the 2nd pilot. Where there was more than one expression of interest per centre, the researcher requested that clinical educators recommend the practitioners that are likely to persevere to the end of the module.

With three overseas centres (two from New Zealand and one from Canada), a decision was made for a 50/50 split between Australian and international participants, with two participants from each overseas centre, and one participant from the Australian centres. In an effort to accommodate more Australian participants, the total number of participants was increased to 14 by accepting two more Australian radiation therapists into the study.

There were six overseas and eight Australian radiation therapists. In terms of Australian participants, the researcher was aiming for a spread of radiation therapy centres across Australia. Preference was given to practitioners from five interstate centres obtained from the National Conference publicity. The remaining three vacancies were offered to the two radiation therapy centres that had the most expressions of interest in the 1st pilot, with the final slot offered to a practitioner, whose centre was not represented in the 1st pilot.

5.4.2 2nd pilot participants

The 2nd pilot module had 12 female and 2 male practitioners. As shown in Table 5.10, participants were slightly younger than the 1st pilot module. There were no participants above 50 years of age. Half of the participants were in their 40s, with approximately a third in their 30s and the rest in their 20s. While the majority of 1st pilot participants had more than 20 years of clinical experience, the 2nd pilot had more participants with less than 5 years of RT experience (see Table 5.10). While the 1st pilot participants had two clinical educators, all

participants from the 2nd pilot were practitioners with one participant participating in clinical trial studies. Two participants out of the 14 in the 2nd pilot had no planning experience while all participants in the 1st pilot had planning experience.

Table 5.10
Demographics of 2nd pilot participants[a]

	Age group			
	20-29	**30-39**	**40-49**	**50+**
Percentage	14.3	35.7	50.0	-
	Number of years of radiation therapy experience			
	Less than 5	**5-10**	**10-19**	**20+**
Percentage	35.7	21.4	14.3	28.6

[a]*n* = 14.

Overall, the 2nd pilot participants had less online experience compared to the 1st pilot participants. A higher percentage of participants in the 2nd pilot module (78.6%) compared to the 1st pilot (66.7%) had no prior online experience. As shown in Table 5.11, the 2nd pilot participants felt confident in only one online activity, rating their skill level in receiving and sending emails as average. All other online activities skill levels were rated as below average, with online discussions forum as the lowest. 57% of the 2nd pilot participants, compared to 42% of the 1st pilot, had no experience communicating via a discussion forum or live chat.

Table 5.11
Online experience of 2nd pilot participants

Description of online activities	**Skill level**	
	Average[a]	**SD**
Using a word processor to write a document	2.79	1.25
Receiving and sending email messages	3.50	0.85
Using electronic databases to search for information	2.43	0.82
Using online activities for your own personal or professional development	2.21	1.21
Communicating online via discussion forum &/or chat rooms	1.21	1.26

[a]*n* = 14.

Preparation of participants for 2nd pilot module

The researcher adopted a similar approach in assisting participants for the 2nd pilot module as in the 1st pilot module. All participants received the same Online Module Resource Folder, albeit with the changes suggested in Section 5.3.4. The module was also released 1 week prior

to the official start of the module. In view of the fact that participants were from overseas and interstate, a face-to-face introductory session was not conducted. This was also in keeping with preparation of the 1st pilot module.

5.4.3 Progress of 2nd pilot module

Of the 14 participants who started, 10 participants successfully completed the module, giving a completion rate of 71.4%. One participant was unable to complete the module due to unexpected family circumstances, while three failed to submit the EBP assignments.

The 2nd pilot participants experienced the same problems as the 1st pilot participants in terms of their limited online skills. The strategies adopted in the 1st pilot were successfully applied. However, these difficulties paled in comparison to the major technical problems encountered in the 2nd pilot module.

The operation of the online module was severely affected by ongoing technical problems, caused by a combination of factors, including the physical move of the University Information Technology Service Centre, preparatory groundwork in anticipation of the impending upgrading of Blackboard in December 2004, and the implementation of the Internet authentication by Information Technology Service Centre.

There was a three-day delay to the start of the module when the technical team discovered that participants were unable to receive emails. Given that the module was scheduled for an earlier start date, the slight delay did not affect the official start of the module.

The 2nd pilot participants were much more interactive than the 1st pilot but the flow of the exchanges was disrupted by the end of Week 4. All participants, including the researcher, were unable to logon to Blackboard during that weekend. Between Week 4 and Week 8 of the module, all participants at one time or other were unable to access Blackboard. In addition, more than half of the participants were regularly being denied access to RMIT University electronic library database, an essential part of their learning activities.

As the moderator of the module, the researcher assumed responsibility for trying to solve the participants' technical problems. However, the queries went on a 'merry-go-round', bouncing

from Technical helpdesk to Online Support and then to the Library and back again. None of the staff was able to explain the reasons for the ongoing technical problems (of denied access to Blackboard and intermittent access to RMIT library electronic database), often claiming that it was the fault of the participants' computers. It was not until the end of Week 8 that a technical staff member finally managed to pinpoint the possible causes and was able to provide a temporary solution to the problems. It appeared that part of the problem was due to the Internet authentication process, which affected only 'students' who were logging on from off campus. This explained why the researcher and the facilitators, who were logging on as staff members, did not experience similar problems. After Week 8, when problems of denied access reoccurred, the same technical staff was able to 'solve' the problems immediately.

Throughout the four weeks of ongoing difficulties, the researcher adopted a proactive approach, responding to each participant's email and updating them on the situation. By the end of Week 8, the researcher sent a group email indicating the possible causes of the problems and the provision of a temporary solution. This strategy of openness paid off, as participants' emails were very positive and upbeat about the entire technical saga, as illustrated by the following comments:

> Not your fault Jenny, you have been great. I have been trying quite a bit over a little while now. Thanks for the information. I look forward to contributing and tell [Facilitator 2] it's not that we think his topic's boring ;-) [P8: 2nd Pilot]

> Thanks Jenny. This should make good reading for your doctorate - how to cope with adversity! [P5: 2nd Pilot]

As part of the regular review, the Action Research Team conducted regular meetings and one of the issues discussed included the impact of ongoing technical problems on the exchanges. Facilitator 2 commented as follows:

> I think the effect of the technical hitches has meant that the three weeks [Current planning practices in breast cancer] has been disjointed compared to the previous module, which has meant that a "flow" was not possible. Despite the adversity, the topic range has been broad and a reasonable number of postings had resulted. Hopefully the participants got something out of these three weeks. [Fac 2]

The disruption caused by the ongoing technical saga was further compounded by the number of participants that went on holiday. The 'exodus' started as early as Week 2. At any one

time, at least one participant was away on holiday, culminating with six participants away on holiday between Week 6 and Week 8. Fortunately, all participants ensured that they completed some activities prior to their departure, or logging on during their holidays, and completing most of the activities when they returned. Facilitator 1 commented on the disruption as follows:

> The technical problems together with the number of people going on holidays have certainly disrupted the flow of the module. [Fac 1]

As a result of the difficulties during these four weeks, the researcher decided to delay the start the 2nd radiation therapy topic to Week 6 instead of the scheduled Week 5. In addition, due to the intermittent problem of denied access to the RMIT library electronic database experienced by a few more participants during the final four weeks of the module, the researcher extended the module by another week, bringing the original 13-week module to 15 weeks.

5.5 Evaluation of online module using Kirkpatrick's four level evaluation model

This section is about evaluation of the online module using Kirkpatrick's four level evaluation model, allowing for the evaluation of participants' reaction to the module (Level 1), participants' learning (Level 2), behavioural change as a result of the participation (Level 3) and evaluation of the impact in the workplace (Level 4) (Baskin, 2001; Kirkpatrick, 1996). Throughout the module, the researcher monitored the development of the participants, matching the learning objectives to the learning outcomes. In this manner, evaluation of learners and the module can be conducted simultaneously (Morphew, 2000, p. 13). Figure 5.2 provides an overview of Kirkpatrick's four level evaluation framework in the present study.

In preparation for the 2nd pilot module, Level 1 and Level 2 data of the 1st pilot module were presented in Section 5.3.4. Hence, this section will examine Level 3 and Level 4 of the 1st pilot module and all four levels of 2nd pilot module. Level 2 content analysis data of both the 1st and 2nd pilot module will also be examined in this section.

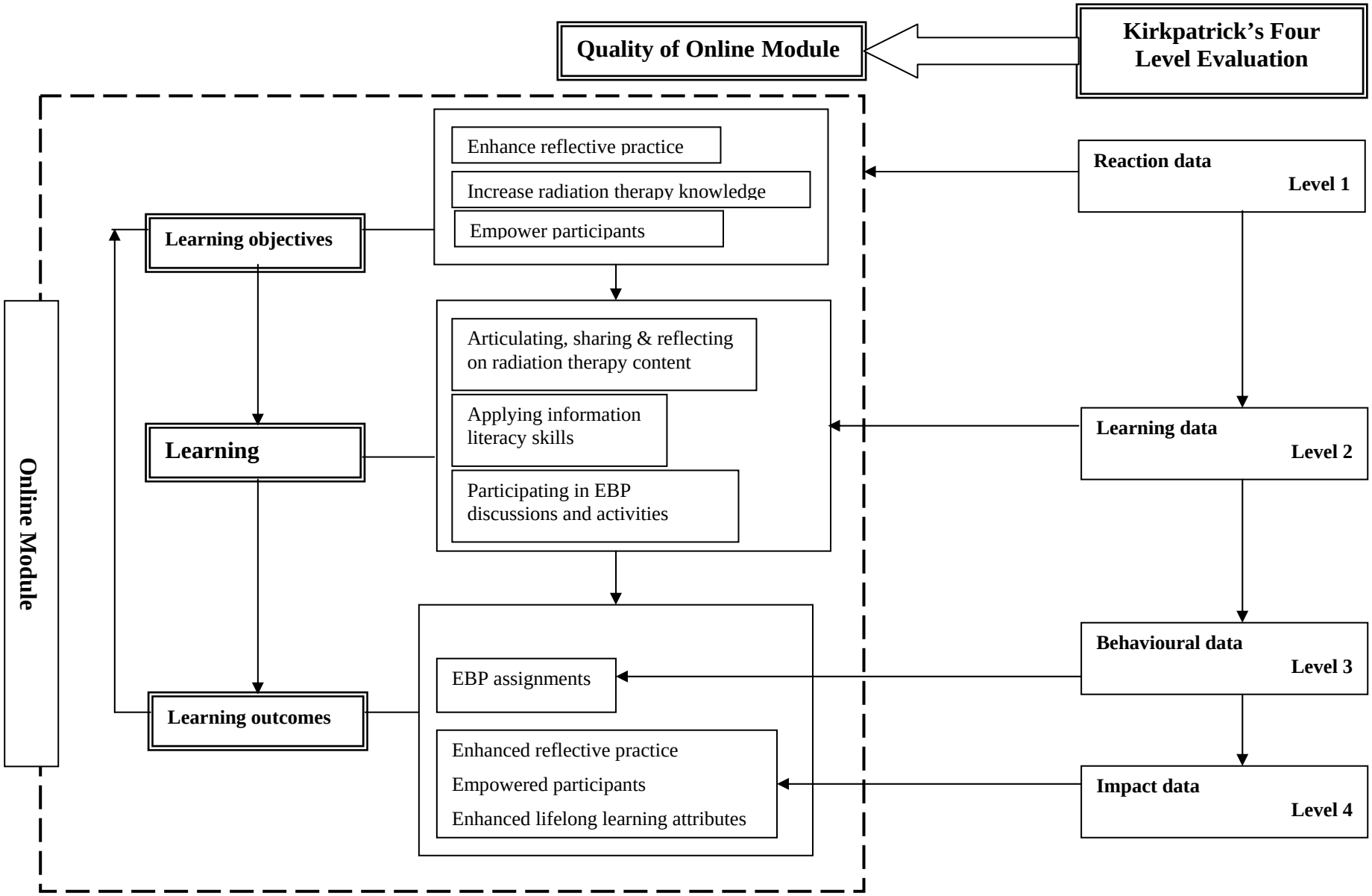

Figure 5.2

Overview of Kirkpatrick's four level evaluation framework

5.5.1 Level 1: Reaction data

The completion rate for the 1st pilot module was 58.3% (7 out of 12 participants) and for the 2nd pilot module was 71.4% (10 out of 14 participants). Only participants who have successfully completed the 1st or 2nd pilot module are included in the data analysis.

Level 1 data of the 1st pilot module was presented in Section 5.3.4. Level 1 (reaction data) refers to how participants react to the module and focuses on the affective aspects of participants learning (Naugle et al., 2000; Winfrey, 1999). Like the 1st pilot participants, the 2nd pilot participants were in agreement that the radiation therapy contents and EBP activities were relevant to their professional needs. All 2nd pilot participants enjoyed the discussions and exchanges and will consider enrolling in a similar format of online learning (see Table 5.12).

Table 5.12
Level 1 data of 2nd pilot participants

Learning outcomes	2nd Pilot[b]	
	Mean	**SD**
Content		
The RT topics were relevant to my professional responsibilities	4.40	0.52
My understanding of the topics was enhanced	4.40	0.52
The EBP activities were relevant to my professional responsibilities	4.00	0.67
My time spent in this online module was worthwhile	4.30	0.67
I enjoyed participating in this module	4.50	0.53
I would enrol in a similar format of online forum discussion module	4.30	0.48
I would recommend this module to my colleagues	4.60	0.52
Process		
The instructions for the activities are clear	4.30	0.48
The prompts provided by the facilitators are helpful	4.20	0.63
The feedback provided by the facilitators is helpful	4.10	0.32
The learning resources examples provided are useful	4.40	0.52
There is sufficient time allocated for each learning activity	3.33	0.87
Context		
You are able to access RMIT Blackboard without difficulty	3.50	0.85
The online discussions provided opportunities for my reflection	4.10	0.32
Exchanges at the Discussion Forum stimulated more exploration of issues than would be possible with individual learning	4.50	0.71

[b]n=10

The technical hitches, in terms of the difficulty in accessing Blackboard and the electronic library database that plagued the 2nd pilot module, was reflected in the lower means of 3.50 compared to 4.14 in the 1st pilot module (see Table 5.12). Despite the technical problems experienced by the 2nd pilot participants, they were still more positive towards the online discussion forum as a platform of learning. The 2nd pilot participants felt that the exchanges at the discussion forum stimulated more exploration of issues as evidenced from higher mean

scores of 4.50 compared to 3.86 for the 1st pilot module (see Table 5.12). One possible explanation of this is that the 2nd pilot participants were much more proactive in exchanging and exploring issues raised in the discussion forum. This accounted for the higher number of messages posted in the 2nd pilot (see Appendix 5.10). Facilitator 3 also observed the greater level of interaction by the 2nd pilot participants as follows:

> In this [2nd] module I thought there was more interaction between participants with a good deal of questions being answered by other participants and an excellent sharing of knowledge. [Fac 3]

5.5.2 Level 2: Learning data

Level 2 (learning data) refers to the type and extent of participants' learning. Multiple data collection strategies were adopted to determine the extent of learning that has occurred. First, using the content analysis approach, the researcher relied on Boud's et al. reflective model to analyse reflection outcomes from messages participants posted at the discussion forum (see Appendix 5.11). Other learning outcomes of the module were also determined using content analysis. Second, a pre-module survey was conducted to determine the levels of computing skills and abilities to reflect (see Appendix 5.12). The same questions were also included in the post module survey to determine changes, if any, of the learning that has occurred. The third source of learning outcomes was from the facilitators' reflective journals.

The researcher will begin the section with the rationale for choosing reflection postings for content analysis. Examples of coding are provided, followed with the results of content analysis on reflection and other learning outcomes.

Reflection postings for content analysis

All messages from discussion forums from the 1st and 2nd pilot module provided the data necessary for evaluating learning outcomes of the module. As it was impossible to code all messages from the discussion forum, only reflection postings (weekly and fortnightly reflections at the conclusion of each topic) were coded for the purpose of analysing reflection. The other learning activities, such as sharing and reflecting on workplace practices and sharing and reflecting on radiation therapy literature, although essential and useful in assisting reflection and consolidating participants' learning, were predominantly focused on sharing and exchanging of information and negotiating of multiple perspectives. Altogether 14

reflection postings were selected for content analysis from the 1st and 2nd pilot module. The reflection postings used for coding are listed in Table 5.13.

Table 5.13
Reflection postings used for coding of reflection outcomes

Conference transcripts	Topic
Week 1 reflections	Access and motivation
Week 2 reflections	Reflecting on reflection
Topic 1 reflections	Role of RT in the management of breast cancer
Topic 2 reflections	Current planning practices for breast cancer
Topic 3 reflections	Tattoos or skin marks?
EBP reflections	Reflecting on their EBP learning
Online module reflections	Reflecting on their online learning experience

However, there are downsides in relying only on reflection postings for coding purposes. First, reflection postings were essentially a summation of participants' learning about the topic. Thus, the researcher is effectively only 'capturing' the end process of reflection, rather than the entire process. Second, the ability to retrieve the reflective data from the postings is dependant on participants' willingness and ability to articulate their reflective thoughts. Admittedly, this is a problem in evaluating any form of students' writings. Despite these constraints, the reflection postings nevertheless provided the best representative samples of messages in this study for assessment of reflection outcomes. To address these concerns, data from the post module survey will be used to triangulate results obtained from the coding analysis.

Examples of coding

All participants demonstrated some elements of reflective processes as identified by Boud et al. This section provides examples of coded reflection postings. Each example is followed by a brief explanation of how the coded text fits in with the criteria of the reflective processes as defined by Boud and his associates.

1st level: Attending to positive and negative feelings

The 1st level involves feelings generated at the beginning of the reflective experience and recognising that these feelings can either assist or hinder the learning process (Boud et al., 1985).

> Also, if only, we could spend more time on an individual plan, instead of just churning out the usual beam arrangement with some minor variations to achieve an "acceptable" plan. I won't stay on that negative note though. The only way forward is to keep trying

> and with my newly discovered research skills, I hope to keep more abreast (no pun intended) of the situation. [P1: 1st Pilot]

The posting above fits into the 1st level coding as it shows how the participant addressed her negative feeling of frustration by using her newly acquired information literacy skills to continue learning and reflecting.

2nd level: Association

The 2nd level involves participant considering multiple perspectives and relating new information with his/her existing knowledge and experience (Boud et al., 1985).

> I have to agree with [Participant 11], that my understanding of the role of RT [radiation therapist] was a bit vague with regards to breast planning and treatment. I appreciate that this module is forcing me to think about how we do things at my centre, and how it compares to other centres and whether it makes any difference. [P1: 2nd Pilot]

The posting above fits into 2nd level coding as it shows how the exchanges at the discussion forum have forced her to consider multiple perspectives by reconciling new ideas with her existing workplace knowledge.

3rd level: Integration

The 3rd level involves synthesis of old and new knowledge resulting in the participant forming new insight (Boud et al., 1985).

> I appreciate that assym jaws, MLCs, dual energy machines, CT, 3D-planning and dynamic wedges have made planning breasts so much easier, but accept that with these improvements comes the added responsibility to achieve a much better plan. [P9: 2nd Pilot]

The posting above fits into 3rd level coding as it shows that as a result of the knowledge (CT, 3D planning and dynamic wedges etc) she has acquired, came the new 'insight' that along with the 'luxury' of improved technology at their disposal, radiation therapists now have the ability and the added responsibility of ensuring quality planning at all times.

4th level: Validation

The fourth level involves the participant testing the validity of new concepts (Boud et al., 1985; Wong et al., 1995).

> I've just returned to planning this week and have had my first opportunity since the start of the year to tackle some tangents! My isocentre matched all the measurements taken in sim, and only a few BAs were needed to reduce UL and LL hotspots… Although the plan I had produced was "acceptable" - I asked the senior RT checking my plan if it would be

> considered going "over the top" to add a lightly weighted 18X beam on the lateral to further reduce the hotspot in the axilla…We gave it a try - 0.15 with 18X and 0.85 with 6X and it worked a treat! Too much on the 18X results in higher dose on the medial side, so this was the best configuration!
>
> It's such a grey area though - if I hadn't asked, the plan would have been accepted, and the patient would be getting an extra 10% in the axilla. If I'd asked another RT, they may have thought the extra work required did not justify the end result.
>
> [P11: 1st Pilot]

The posting above fits into 4th level coding as it shows how the participant, instead of simply adhering to the standard planning protocol, went out of her way to test a new concept (ie. new ways of tackling some tangents) she has learned.

5th level: Appropriation

The 5th level involves the process of internalising the knowledge into the participant's cognition (Boud et al., 1985).

> I very much enjoyed reading the example on how to reflect on literature reading which applies also to many other things that we do and can reflect on. I am much more conscious of reflecting on all that I am doing at the moment because of this week and not doing things just because that is the way I or we have always done them. [P14: 2nd Pilot]

The posting above fits into 5th level coding as it shows how the participant is internalising the process of reflection into her awareness and daily approach towards work.

6th level: Reflection outcomes

Reflection outcomes ranged from changes in behaviour (action outcomes), changes in the learner's affective state (affective outcomes) and/or perspectives (perspectives outcomes) (Boud et al., 1985). All participants who successfully completed the modules demonstrated reflection outcomes. In order to differentiate these different types of reflection outcomes, the researcher has further divided reflection outcomes here into three sub-categories: action, affective and perspectives.

6th level: Reflection outcomes (action)

The 6th level of action outcome involves a new way of doing things, development of new skills, commitment to action and or readiness for application (Boud et al., 1985, p. 34).

> Yes, [Participant 11], I feel ready to practice reflecting on an article now rather than just reading it. It will also help me for CPD as you have to write a little on "My reactions to

> this event" and "what I have learned from this event that will professionally assist me" when you have been on a course etc. [P5: 2nd Pilot]

The posting above fits into the coding as the reflective learning resulted in the participant's readiness to apply her newly acquired reflective skills into action via her literature reading and CPD portfolio.

6th level: Reflection outcomes (affective)

The 6th level of affective outcome involves changes in attitude or emotional state. Specifically, it refers to "a positive attitude towards learning in a particular area, greater confidence or assertiveness, or a changed set of priorities" is classified as outcome of an affective nature (Boud et al., 1985, p. 34).

> Honestly, I did not search and read articles for years. I found that I am very behind with all the RT [radiation therapy] news that is happening out there. This course helped to make me become more motivated and it makes me wanting to find out more about 'everything'. [P12: 1st Pilot]

The posting above fits into the coding as the reflective learning resulted in the participant's changed attitude of wanting to find out more about the latest literature and increased her motivation towards learning.

6th level: Reflection outcomes (perspectives)

The 6th level of perspective outcome involves changes in perspectives and values (Brookfield, 2000; Mezirow, 1990a).

> I really enjoyed this week and it has changed my perception of reflection, I think that I can see its use in a lot more situations now. [P4: 2nd Pilot]

The posting above fits into the coding as the reflective learning resulted in the participant changing her perspective on reflection.

To ensure inter-rater reliability, the supervisor independently coded two sets of reflection postings, one from each pilot module. This is equivalent to 14% of the total postings that were coded. Attention was focused on the correct application of concept and definition of reflective process rather than on the agreement of starting and ending of the code. This is because the latter is often arbitrary and thus not a good measure of reliability (Gibbs, 2002). Consultation between the researcher and the supervisor before and after the coding process showed a 90% agreement, indicating a satisfactory level of inter-rater agreement (Rourke et al., 2001),

Results of content analysis on reflection

Table 5.14 and 5.15 show the reflective processes and reflection outcomes experienced by the 1st and 2nd pilot participants respectively. Some educational researchers maintain that using the highest level of reflection outcomes gave "over-estimated reflective scores" and proposed instead use of the mean reflective score of each participant as a more accurate measure of the reflective process (Hawkes & Romiszowski, 2001, p. 292). However, as the reflection postings, chosen here for content analysis, recorded participants' sharing of their learning at the end of each topic, rather than a record of the continuum of participants' reflective process, it would be inappropriate to obtain the mean reflective score from these reflection postings. In addition, for the purpose of the study, the researcher is interested in finding out if the reflective activities embedded in the online module in any way changed participants' approaches to their workplace practices. The results in Tables 5.14 and 5.15 not only give an indication of the level of reflective process experienced by each participant but also show the extent of the reflection outcomes. Thus, although this approach does not indicate the mean reflective scores of the exchanges of each participant, relying on the frequency count of reflection outcomes was an appropriate and adequate methodology to determine participants' reflection outcomes.

Table 5.14
Level 2 learning data: Coding results of reflection outcomes for 1st pilot participants

Level of reflective process	Code	1st pilot participants							
		1	**2**	**4**	**7**	**8**	**11**	**12**	**Total**
Returning to experience: Sharing and exchanging information	0	2	5	3	2	5	11	7	**35**
Attending to feelings	1								
Positive feelings	1A	3	-	-	-	-	-	1	**4**
Negative feelings	1B	1	-	-	-	-	-	-	**1**
Association	2	2	3	5	2	3	4	2	**21**
Integration	3	1	1	-	2	1	2	1	**8**
Validation	4	-	-	-	-	-	1	-	**1**
Appropriation	5		-	-	-	-	-	-	-
Outcomes of reflection	6								
Action	6A	3	3	3	2	3	2	4	**20**
Affective (emotions)	6B	-	-	-	2	-	-	1	**3**
Perspectives	6C	3	1	-	1	-	-	1	**6**
Total		**15**	**13**	**11**	**11**	**12**	**20**	**17**	**99**

Table 5.15
Level 2 learning data: Coding results of reflection outcomes for 2nd pilot participants

Level of reflective process	Code	2nd Pilot Participants										
		1	**2**	**4**	**5**	**8**	**9**	**10**	**11**	**12**	**14**	**Total**
Returning to experience: Sharing and exchanging information	0	9	12	11	15	11	7	9	18	5	2	**99**
Attending to feelings	1											
Positive feelings	1A	2	1	-	2	1	2	2	2	1	2	**15**
Negative feelings	1B	2	1	1	-	-	1	1	-	1	1	**8**
Association	2	4	1	2	3	1	1	2	5	-	1	**20**
Integration	3	-	1	1	1	-	2	1	2	-	-	**8**
Validation	4	-	-	-	-	-	-	-	-	-	-	-
Appropriation	5	-	-	-	-	-	-	-	1	-	1	**2**
Outcomes of reflection	6											
Action	6A	2	2	4	2	1	1	1	6	4	2	**25**
Affective (emotions)	6B	-	-	-	-	-	-	-	1	-	1	**2**
Perspectives	6C	-	-	1	-	2	-	-	3	2	1	**9**
Total		**19**	**18**	**20**	**23**	**16**	**14**	**16**	**38**	**13**	**11**	**188**

All participants started with the process of describing their workplace practices and the sharing and exchanging of information. The 2nd pilot participants showed evidence of more sharing and exchanging of experiences than the 1st pilot participants (see Tables 5.14 and 5.15).

In terms of the 1st level of reflection (attending to feelings) all 2nd pilot participants (100%), compared to only two 1st pilot module participants (28.6%), expressed their emotions in reflection postings. This higher number of postings in the 2nd pilot is due to the more expressive and responsive nature of the 2nd pilot participants. On average, the 2nd pilot participants posted 5 more messages than the 1st pilot participants (see Tables 5.14 and 5.15).

All participants (100%) in the 1st and 2nd pilot module, with the exception of one participant (10%) in the 2nd pilot, demonstrated association. Seven participants (85.7%) and ten participants (60%) in the 1st and 2nd pilot module, respectively, were coded to show process of integration (see Tables 5.14 and 5.15). This suggests that participants were able to relate their pre-existing experiences and knowledge to their newly acquired knowledge (association) and to translate these learning experiences into new perspectives (integration).

Only one participant (14.3%) was coded on the process of validation and two participants (20%) on appropriation for the 1st and 2nd pilot, respectively (see Tables 5.14 and 5.15). One

possible reason may be that while learners are able to show evidence of association, relatively fewer learners are reported to be able to demonstrate higher levels of validation and appropriation (Wong et al., 1995). However, the fact that not all participants demonstrated the validation and appropriation does not necessarily indicate their inability to reflect at these levels. It may be simply that they did not articulate that aspect of reflection during their reflection postings. Another possible explanation is that some learners were able to achieve reflection outcomes without the need to experience each reflection level (Boud et al., 1985).

As a result of the reflective dialogues and reflective activities, all participants had at least one coding that demonstrated an action outcome of reflection activities in the module (see Tables 5.14 and 5.15). In terms of reflection outcomes, most of the outcomes came under the action category (see Tables 5.14 and 5.15). This refers to explicit expressions by participants about their commitment to action, readiness to apply their new knowledge and skills, or simply indicating development of new skills. In this study, action assumed the form of using their newly acquired knowledge, applying their reflective and/or information literacy skills, with the ultimate aim of initiating new projects, or assessing and suggesting changes to their workplace practices, as illustrated by the following comments:

> I am now confident in knowing where to search for information and I have lots of little projects that I can do in mind. [P12: 1st Pilot]
>
> I hope I can look at practices in our dept and use some of the knowledge gained to assess and maybe even change! [P12: 2nd Pilot]

Only two participants from both pilots (28.6% and 20% for the 1st and 2nd pilot respectively) expressed affective outcomes of reflections, while three (42.8%) and five (50%) participants from the 1st and 2nd pilot respectively, experienced a change in perspective (Table 5.14 and 5.15). All three elements of reflection outcomes (action, affective and perspectives) are illustrated in the following comment:

> I certainly got what I had hoped to out of it [the online module], and more! I became more enthusiastic about CPD [affective] and decided to attend the conference [action] that [Participant 8] organised. I also felt more informed [affective] when I did attend the conference and the Varian users meeting and therefore got more out of them too. I now feel a bit more prepared and less apprehensive about the new technology we will be getting and more confident and enthusiastic about getting involved in its introduction [perspectives]. I also think that I will now get more out of reading and appraising articles

than I did before participating, and can now do literature searches too [action]. [P11: 2nd Pilot]

Pre and post module surveys were conducted to provide more information about the learning outcomes of the module. In the pre and post module surveys, participants were asked to rate their ability to reflect on professional reading on a 5-point Likert scale, with 1 being very low ability and 5 corresponding to very high ability.

In the 1st pilot, three participants (42.9%) indicated their ability to reflect on professional reading has improved while the other four participants (57.1%) reported their ability to be the same (see Figure 5.3). In analysing the result, Participant 11, who was one of the participants who reflected well on the literature reading, had not reported an increase in her ability to reflect on professional reading.

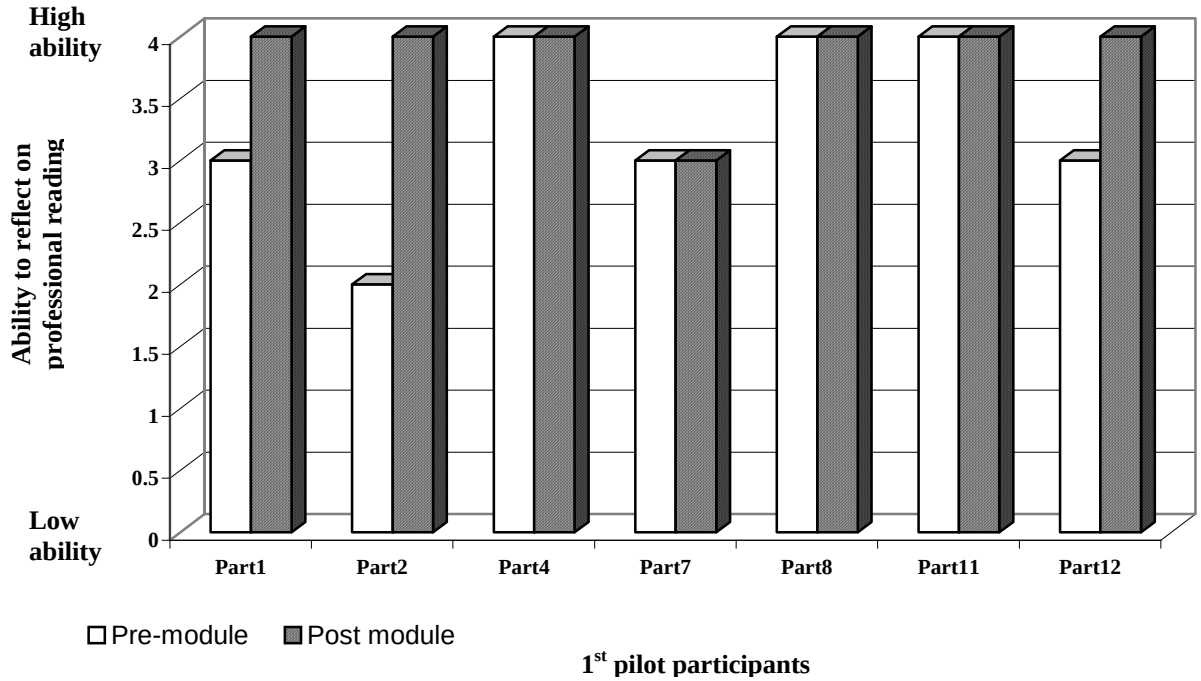

Figure 5.3
Comparison of pre and post module survey on ability to reflect on professional reading for 1st pilot participants

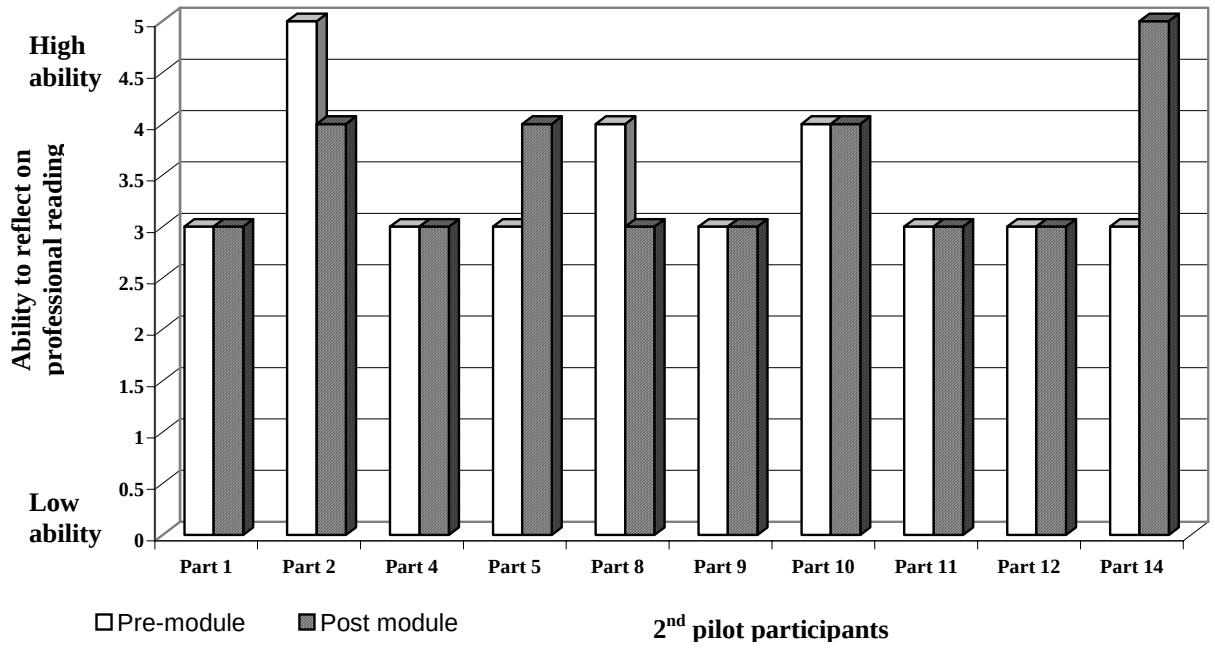

Figure 5.4
Comparison of pre and post module survey on ability to reflect on professional reading for 2nd pilot participants

In the 2nd pilot, only two participants (20%) reported an increase in their ability to reflect on their reading, with six participants (60%) remaining the same, while two participants (20%) indicated their abilities had decreased since the completion of the module (see Figure 5.4).

Thus, out of a total of 17 participants who had completed the module, only 5 participants (29.4%) reported an improved ability to reflect on their professional reading. Although disappointing, this result was to be expected. This is because the researcher was already aware that during the 3Rs (reading, reflecting and responding to peers' contributions) activities, participants were merely critiquing the journal articles and not reflecting on the literature. This was especially the case in the 2nd pilot, which therefore accounts for the smaller number of participants who reported improved ability to reflect on their reading.

Assuming the role of the moderator, the researcher posted a number of reminders on how to reflect, encouraging participants to include reflection of the literature in their postings. Despite these efforts, participants who did not include reflection in their initial postings did not back track to do the reflection component. Given that participation in the module was

voluntary and there was no formal award, it was not possible to rely on formal assessments to ensure participants complete the reflection before progressing to the next topic.

In the 2nd pilot, there were three participants (30%) who reported a decrease in their ability to reflect on professional reading after the module (see Figure 5.4). In the 3Rs activities (read, reflect and respond), the three participants had simply chosen to focus on one or two points in the literature and then responded to their peers. There were no attempts to critique or reflect on the literature. However, the same three participants had demonstrated reflection outcomes in other parts of the module. Two participants' reflection outcomes were concerned with the application of EBP at their workplace while another had indicated his understanding of reflection and his experience in the module had influenced the way he shared his reflection experience with his colleagues.

On their level of ability to apply reflective practice in the workplace, participants were asked in the post module survey, to rate their ability to apply knowledge more effectively by engaging in reflective practice. The mean scores were 4.00 and 3.80 (SDs = 0.58 and 0.63) for the 1st and 2nd pilot participants respectively on a 5-point Likert scale of 1 (very low) and 5 (very high).

Results of content analysis of other learning outcomes

The coding framework on other learning outcomes was based on the learning objectives of the online module (see Appendix 5.13). These learning outcomes included participants' increased understanding in radiation therapy, increased motivation for learning, sharing their learning with colleagues, increased confidence as self-directed learners, increased information literacy skills and increased understanding of EBP (see Table 5.16). The same reflection postings that were used to code reflection outcomes were also used to code these learning outcomes (see Table 5.13). As discussed previously (see Section 5.5.3), the downside of using only reflection postings for coding is that unless participants articulate the specific outcomes in their final reflections postings, the learning outcomes will not be coded. As in the 1st pilot module, the same technique of counting participants' learning outcomes, as expressed by participants in the reflection postings, was adopted (see Table 5.16). Whenever possible, the content analysis results are discussed in conjunction with the quantitative data obtained in the post module survey. Given that Level 2 data of the 1st pilot module was already presented in Section 5.3.4, only the 2nd pilot module will be presented here.

Table 5.16
Level 2 data of 2nd pilot participants[a]

Learning outcomes	Participants' postings indicating successful learning outcomes	
	Count	**%**
Enjoyed exchanges at discussion forum	10	100
Shared learning with colleagues	8	80
Increased confidence as self-directed learner	3	30
Ability to retrieve articles	4	40
Acquired online learning skills	3	30
Ability to review literature	2	20
Increased in radiation therapy knowledge	5	50
Understand EBP in radiation therapy context	1	10

[a]n=10

Only half of the 2nd pilot participants expressed increased radiation therapy knowledge in the reflection postings. This does not necessarily imply that the other half of the participants did not experience an increase in radiation therapy knowledge as they could have expressed that same outcome in other postings that have not been included for coding. Participants who articulated the outcome commented as follows:

> I have learnt a lot more about breast treatment and planning and have a lot more I want to continue to investigate. [P11: 2nd Pilot]
>
> I learned so much about planning through the module and questioning radiation therapists in my practice. [P12: 2nd Pilot]

> I agree [Part 5], my brain has had a definite workout too. In fact before doing this module I didn't realise quite the number of things that could be investigated in relation to breast treatments. [P4, 2nd Pilot]

'Enjoy exchanges at discussion forum' is the only learning outcome that was explicitly expressed in the reflection postings by all participants, as illustrated by the following comments:

> Hi I have enjoyed logging in each day to see what people have posted. I think there are so many little things as well as the major issues discussed. [P8: 2nd Pilot]

> I love reading of everyone else's thoughts and experiences, they give me a lot to think about. [P9: 2nd Pilot]

With the positive feeling towards this form of online learning, participants in both 1st and 2nd pilot module reported that they were motivated to learn; confirming that positive feeling has a

beneficial effect on learning (mean scores of 4.0 and 4.2 for the 1st and 2nd pilot respectively, see Table 5.17).

Table 5.17
Post module survey results of 1st and 2nd pilot participants

Learning outcomes	1st Pilot[a]		2nd Pilot[b]	
	Mean	SD	Mean	SD
As a learner				
My confidence as a learner increased	4.57	0.53	3.90	0.57
I am more confident in setting my own learning agenda	4.00	0.00	3.90	0.57
I am motivated to learn	4.00	0.58	4.20	0.42
I have learned about accessing & retrieving relevant articles via electronic database	4.43	0.53	4.22	0.44
My ability to review, analyse and critically evaluate literature has been enhanced	4.00	0.58	4.40	0.52
About online learning				
I am more confident about online learning	4.43	0.53	4.60	0.52
About EBP				
I have a better understanding of EBP in RT	3.86	0.69	4.40	0.52
Sharing their learning with colleagues				
I am more confident in initiating professional discussions in my workplace	3.86	1.35	3.80	0.79
I am more confident in participating professional discussions in my workplace	3.86	1.35	4.20	0.79

[a]n=7 [b]n=10

Between 85% and 80% of the participants in the 1st and 2nd pilot respectively, indicated that they have shared their online learning with their colleagues (see Tables 5.9 and 5.16). Participants from the 1st and 2nd pilot module often shared the exchanges that took place in the discussion forum, questioning the rationale of not only their own departmental protocols but other centres as well, effectively carrying the reflective dialogues into the workplace. This, in turn, generated considerable discussions and interest amongst the colleagues about reflection and the online module. In terms of their level of confidence in participating in workplace discussion, the 2nd pilot participants were reported to be slightly more confident (see Table 5.17).

In the post module survey, participants in both pilots reported an increase in confidence as a learner and an increase in information literacy skills. However, results from content analysis shows that only 57% and 40% of the participants in the 1st and 2nd pilot module expressed increased information literacy skills (see Tables 5.9 and 5.16). Given that all these participants have successfully completed the online module, it was logical to assume that all participants have at least attained the basic online learning skills and ability to retrieve articles

from the electronic library database. This assumption was supported by the post module survey where the means scores for information literacy skills were 4 and above (see Table 5.17). Thus, despite the lack of explicit expressions by some participants of information literacy outcomes in their reflection postings, participants were in general agreement that as a result of their participation in the module, their online and information literacy skills have improved.

In terms of participants' understanding of EBP, only one participant had explicitly expressed understanding the EBP concept, as the following comment illustrates:

> Although I found the [EBP] assignment challenging I feel I got a lot out of it, and I hope to follow through on what I have planned to do. I feel I have gained a better understanding of what may be required to implement a new technique, and that a lot of teamwork is required. [P11: 2nd Pilot]

However, the 2nd pilot participants had certainly benefited from the EBP discussions and assignment as evidenced from the post module survey. The increased interaction in the 2nd pilot may also account for the reason why participants in the 2nd group felt that they have achieved a better understanding in their EBP activities than the 1st pilot; mean scores 4.40 and 3.86 for the 2nd and 1st pilot, respectively (see Table 5.17).

Table 5.7
Kirkpatrick's four level evaluation model and corresponding data collection strategies

Evaluation level		Data collection strategies
1	Reaction data	Mid module survey Post module survey Messages posted at discussion forum
2	Learning data	Pre-module survey and Post module survey Content analysis of reflection postings via Boud et al framework Content analysis of other learning outcomes via learning objectives of online module Facilitators' reflective journals Participants' learning portfolio
3	Behavioural data	Workplace survey (to be completed by Supervisor) EBP assignment assessment Messages posted at discussion forum 3-month post module survey
4	Impact data	Workplace survey 3-month post module survey Learning portfolio of participants Continuing communication with participants

Source: Adapted from (Kirkpatrick, 1996; Kirkpatrick, 1998)

The following sections examine Level 3 and Level 4 data from the 1st and 2nd pilot module. To facilitate easy reading, Table 5.7, which details the data strategies used in the study, is repeated here. Two data strategies, Workplace Survey and a 3-month post module survey were used in both Level 3 and Level 4 evaluation.

5.5.3 Level 3: Behavioural data

Level 3 evaluation refers to behaviour change that occurs as a result of the learning that has occurred (Kirkpatrick, 1998; I. Smith, 2004). Thus, Level 3 seeks to determine the extent to which participants have applied their newly acquired knowledge and skills in their workplace practice (Diefes-Dux, Samant, Johnson, & O'Connor, 2004; Long, 1999; Winfrey, 1999). This data is referred to as behavioural data.

Data collection methods here included the EBP assignment, the 3-month post module survey and the supervisor's report. The latter included supervisors' observations and reports of job behaviour (Long, 1999). The Action Research Team felt that mandating the supervisors' report was far too intimidating and politically sensitive, posing unnecessary concerns for would-be participants. Making supervisor's evaluation mandatory may also deter practitioners from volunteering for the online module (Action Research Meeting 1, 3 February 2004). Hence, the idea of making supervisor's report mandatory was abandoned.

Instead, the researcher decided to make the completion of supervisor's report optional. Thus, the Supervisor report was renamed 'Workplace Survey'. Upon completion of the module, each participant received two sets of documents. The first set consisted of the Workplace Survey (Appendix 5.14) and a letter addressed to the Supervisor (Appendix 5.15), seeking the Supervisor's assistance in completing the Workplace Survey. The second set of documents consisted of a letter addressed to the participant, explaining the rationale of the Workplace Survey and seeking the participant's assistance in forwarding the Survey and letter to the Supervisor (Appendix 5.16). Each participant had the opportunity to read the Survey and decide if she/he wished to have their Supervisor complete the Workplace Survey. The researcher is therefore dependent on the participant to forward the Workplace Survey. By making the process transparent and open, and leaving the participants themselves to be in charge of the evaluation process, the researcher addressed the ethical dilemma of workplace report and aimed to receive more support from participants.

As participants were applying the EBP approach to a workplace problem, the EBP assignment therefore served as another form of data. As discussed previously, time and political constraints made implementation of EBP in the workplace impossible (see Section 5.1). Thus, the trade-off was having participants implement EBP on paper, which still allowed participants to apply their learning. The assignment provided the data to inform the researcher of the participants' ability to apply their newly acquired knowledge, information literacy and reflective skills.

Workplace Survey

The response rate for the Workplace Survey was 71.4% and 40% for the 1st and 2nd pilot, respectively. The low response rate in the 2nd pilot was partly due to the failure of three supervisors to complete the surveys. The researcher has sent three reminders to the three participants and on each occasion, was informed that the supervisor(s) has been prompted to complete the Survey. The failure of the three supervisors to return the surveys may be indicative of the low level of importance workplace management attaches to practitioners' CPD.

The aim of the Workplace Survey was to establish if there were any changes in the participant's approach towards radiation therapy planning and any behaviour and attitudinal changes as a result of their involvement in the module (Level 3 data). In addition, the supervisor was asked if participant's learning resulted in any positive impact on the workplace (Level 4 data which will be presented in the subsequent section).

For both the 1st and 2nd pilot module, aside from two participants, all supervisors reported changes in terms of workplace practices, radiation therapy planning and attitudinal changes. The latter included displaying a positive attitude at work, increased confidence in tackling computer related tasks and displaying a keenness to search for information on the Internet. Participants were also reported to be much more confident and much more enthusiastic towards work and radiation therapy planning in particular.

Changes in workplace behaviour included participants venturing ideas and suggestions during staff meetings. Participants were reported to be actively seeking information and engaging in information searches. Some had begun to adopt an evidence-based approach in making suggestions or when seeking clarification from colleagues.

In terms of radiation therapy planning, three participants from the 1st and 2nd pilot module (17.6%) showed an increased appreciation of the complexities of radiation therapy planning, which was not present prior to the participation in the module. Other noticeable changes were also reported. These included being proactive in suggesting new ideas and changes in radiation therapy planning. Thus, instead of simply adhering to the standard protocols for all patients, participants were reported to be re-evaluating planning in an effort to achieve better treatment outcome for individual patient or reviewing their plans in an effort to achieve dose reduction. From the supervisors' report, it was evident that topics that were discussed extensively in the forum were indeed followed up by participants in their radiation therapy planning.

Data for two participants (11.8%) suggested minimal or no changes. Since completion of the module, Participant 4 of the 1st pilot has assumed a new role of clinical educator and the supervisor reported that it was thus difficult to comment on changes relating to radiation therapy planning since Participant 4 has not returned to that area of responsibility. With the 2nd pilot, Participant 9 was reported to have no change in behaviour, attitudinal changes or workplace practices. According to the Supervisor, this is because Participant 9 has always been proactive in suggesting ideas and has always been supportive of her colleagues in workplace discussions.

EBP assignment assessment

The EBP assignment was divided into two sections. Part One consisted of identifying the EBP question, critiquing of literature and reflecting on the selected article. In Part Two of the assignment, participants had to show their ability to see the 'big picture' by identifying the problems they are likely to encounter in the event of EBP implementation in their workplace, strategies to address the identified problems and an action plan that would bring their EBP proposal closer to success (see Appendix 5.17).

The assignments were randomly distributed amongst the facilitators, with each facilitator assuming responsibility for marking an equal number of assignments. Each participant received detailed feedback from an assigned facilitator. In addition, the researcher provided assessment scores for each of the sections identified in the EBP criteria (see Appendix 5.18). The scoring, however, was only for the benefit of the researcher. The researcher relied on the facilitators, who are the radiation therapy experts, to assess the assignment. Tables 5.18 and

5.19 show the results of the EBP assignment from the 1st and 2nd pilot respectively. A tick indicates that the participant has obtained 50% or more on the section while a cross indicates the participant failed to pass the corresponding section.

Table 5.18
Level 3 data: EBP assignment of 1st Pilot

EBP assignment	1st pilot participants						
	1	**2**	**4**	**7**	**8**	**11**	**12**
EBP focus							
Critique of selected literature	✓	✓	✓	✓	×	✓	✓
Reflecting on literature	✓	✓	✓	✓	✓	✓	✓
Ability to adopt big picture							
Ability to identify obstacles in EBP implementation	✓	✓	✓	✓	✓	✓	✓
Ability to suggest solutions	✓	✓	✓	✓	✓	✓	✓
Ability to identify action plan	✓	✓	✓	×	✓	✓	✓

In the 1st pilot, only one participant failed to critique the article and another failed to identify an action plan that would enable her to work towards a successful outcome (see Table 5.18). In the 2nd pilot, while two participants failed to identify a successful action plan, four participants failed to adopt the big picture. They failed to demonstrate their ability to identify problems and the corresponding strategies to address the problems in EBP implementation. Another two failed to critique the literature while one failed to reflect on a selected literature article (see Table 5.19). The researcher was unable to determine if the ongoing technical problems experienced in 2nd pilot module in any way accounted for the poorer EBP assignment performance.

Table 5.19
Level 3 data: EBP assignment of 2nd Pilot

EBP assignment	2nd pilot participants									
	1	**2**	**4**	**5**	**8**	**9**	**10**	**11**	**12**	**14**
EBP focus										
Critique of selected literature	✓	✓	✓	✓	×	✓	×	✓	✓	✓
Reflecting on literature	✓	✓	✓	✓	×	✓	✓	✓	✓	✓
Ability to adopt big picture										
Ability to identify obstacles in EBP implementation	✓	×	✓	✓	×	✓	×	✓	×	✓
Ability to suggest solutions	✓	×	✓	✓	×	✓	×	✓	×	✓
Ability to identify action plan	✓	×	✓	✓	✓	✓	✓	✓	×	✓

The scores for the assignments ranged from 34% to of 81%. Given that there were three facilitators marking the assignments, it was possible that their assessment standard would vary. The researcher has therefore taken the additional step of attempting to 'standardise the marking' by asking one facilitator to share his marking and comments with the other two facilitators before they commenced their marking. Based on the facilitators' feedback to the participants and facilitators' EBP comments to the researcher, there was no evidence to indicate that facilitators marking varied considerably.

Overall, the scores from the facilitators matched the EBP feedback provided to participants, with only two minor inconsistencies. In the 2nd pilot, two facilitators assessed two participants as failing to demonstrate the ability to adopt the big picture. However, they were assessed as having the ability to identify an action plan, albeit both only managed to score a 50% pass in the action plan. If they were unable to adopt the big picture by identifying the obstacles and the corresponding solutions, then it follows that their ability to identify a future action plan would be in question.

3-month post module survey

The aim of the 3-month post module survey was to determine if the participants were still engaging in reflection and pursuing their EBP projects in the workplace (see Appendix 5.19). Participants were asked to address three questions. The first question aimed to determine if participants have been reading and reflecting on their literature reading and continuing to engage in reflective practice in their workplace. The second question ascertained if they had been working towards their EBP projects. The third and final question asked participants if their participation in the online module had any impact on their personal and professional lives. For the purpose of Level 3 (behavioural data) evaluation, the researcher will address the first two questions here, leaving the final question to Level 4 evaluation.

With the 1st pilot, only two participants (28.6%) indicated that they were continuing to read and reflect on RT literature (see Table 5.20), while seven participants (70%) reported reading and reflecting on literature in the 2nd pilot (see Table 5.21). The common reasons cited for not engaging in reading and reflecting was the lack of time, with one participant citing they were operating only at 50% of their staffing level due to staff shortages. On the other hand, a few participants gave examples of literature they have been reading and the issues they have been grappling with and reflecting on.

Table 5.20
Level 4 result data: 3-month post module survey of 1st pilot

3-month post module survey	1st pilot participants						
	1	2	4	7	8	11	12
Reading and reflecting on literature	No	No	Yes	No	Yes	No	No
Reflecting in the workplace	Yes[a]	No	Yes[a]	Yes	Yes[a]	Yes	Yes[a]
Engaging in EBP activities	No	Yes	No	No	No	Yes	Yes
Impact on personal and professional practices	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: [a]Only Participant 4, 8 and 12 showed evidence of reflecting in the workplace.

Table 5.21
Level 4 result data: 3-month post module survey of 2nd pilot

3-month post module survey	2nd pilot participants									
	1	2	4	5	8	9	10	11	12	14
Reading and reflecting on literature	Yes	Yes		No	Yes	Yes	Yes	Yes	No	Yes
Reflecting in the workplace	Yes[a]	Yes[a]		Yes	Yes[a]	Yes[a]	Not yet	Yes[a]	Yes	Yes[a]
Engaging in EBP activities	No	Yes		No	Yes	Yes	Yes	Yes	No	Yes
Impact on personal and professional practices	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Participant 4 did not return the 3-month post module survey.
[a]Participants 1, 2, 8, 9, 11and 14 showed evidence of reflecting in the workplace.

On the question of reflecting in the workplace, for the 1st pilot, one participant (Participant 2) indicated that she has been "far too busy coping with the workload" to reflect, while the six other participants indicated that they have been engaging in reflective practice. Of the six, three participants (42.9%) indicated that they reflected during the regular fortnightly technical meetings, with one (Participant 1) adding that reflection also "occurs informally throughout the working day on a personal level". Perhaps with the exception of Participant 1, the fact that reflection is limited to only formal meetings calls into question the extent to which reflection has been successfully internalised into the other two participants' workplace practices?

The other three participants elaborated how they reflected in the workplace. Participant 12 indicated that she has been assisting her students to reflect on their case studies and also reflecting on how she can assist the students further in their learning. Participant 4 has been reflecting on how to improve their workplace set ups, placements of tattoos as well as assisting in developing a system to assist students in their planning treatment. Participant 8 indicated that she has been reflecting everyday "on a variety of things – all sorts of actors influencing our breast set-up, to how I can plan something more homogeneously." [P8: 1st Pilot] Thus, although there were six participants from the 1st pilot who indicated that they are reflecting in their workplace, the detailed elaboration provided the researcher with the

evidence that there were only four participants (Participants 1, 4, 8 and 12) or 57.1% of the 1st pilot who were still actively engaging in reflective practice at work.

In the 2nd pilot, while eight participants (80%) reported to be reflecting in the workplace. Based on the evidence provided, six participants (60%) were deemed to be reflecting on a regular basis (see Table 5.22). Some examples include reflecting on patient care, lower pelvic treatment, port films, reviewing planning techniques plus working in committees that require review of clinical practice, policy and documentation. Two participants highlighted the importance of having peers to support reflection, with one indicating that although she continued with her literature reading, she found it hard to reflect as she requires the "stimulus of a discussion to formulate" some of her thoughts [P12: 2nd Pilot]. Another suggested having someone acting as a mentor, "who can ask appropriate questions to ensure that the reflection goes somewhere and it's not just a self-justification" [P2: 2nd Pilot]. This shows that group reflection plays an important role in triggering and sustaining a learner's reflection and learning (Ghaye & Ghaye, 1998; Mezirow, 1990b).

In terms of engaging in EBP activities, three participants (43%) from the 1st pilot continued to work on their EBP proposals. Two participants presented their EBP proposals at departmental staff meetings, with the intention of continuing with their projects. Another started a mini project of her own. She was investigating "a couple of techniques to stabilise large breasted patients. Still developing and trying to come up with a better design… Got a couple of colleagues involved so things are looking promising." [P12: 1st Pilot] Thus, of the seven participants who completed the module, three participants (43%) were still following through with their EBP proposals.

In the 2nd pilot, six participants (60%) reported continuing with their EBP work, with three choosing to work on a different topic from their EBP assignment. These included exploring breast technique changes and techniques regarding patient's masks. Unfortunately they did not provide sufficient details for the researcher to validate their claims. Of the four participants who were not engaging in EBP work, only two volunteered reasons for not participating; that their planning software were in the process of being upgraded and thus any changes had to be put on hold.

Data from the 3-month post module survey showed that for both the 1st and 2nd pilots, approximately 53% of the participants continued to reflect in their literature and engage in reflective practice in the workplace. Another 53% continued to work towards their EBP activities by either presenting their EBP assignments or investigating various techniques to advance clinical practice.

5.5.4 Level 4: Impact data

Level 4 evaluation refers to the participants' impact on the workplace as a result of their learning (Kirkpatrick, 1998). While the first three levels of evaluation focus on participants' learning, Level 4 evaluation centres on participants' workplace (Boulmetis & Dutwin, 2000).

In terms of business organizations, Level 4 evaluation measures the success of the program in terms of its tangible impact on increased productivity and sales, higher efficiency, reduced cost of production and the intangible such as improved morale (Long, 1999; Smith, 2004). In the present study, examples of Level 4 success in the MRS workplace includes practitioners advancing workplace practices, varying workplace protocols (when needs arise) to better treatment plans, and the intangibles such as increased confidence, enthusiasm and positive attitude.

Data collection methods included the Workplace Survey, the 3-month post module survey and the participants' learning portfolio (see Table 5.7). In addition, the researcher will also be reporting on a few participants' progress as they voluntarily continue to update the researcher.

3-month post module survey

On the question of whether participation in the module has impacted upon their personal or professional lives, all participants in both pilots were unanimous that the learning experience had a positive impact on their professional development. The common response was that the module has given them the added confidence in attempting new initiatives in their workplace as evidenced by the following comments:

> Participation in the module has given me greater conference in my skills and this in turn has led to taking on greater responsibility. I'm starting to check treatment plans for the first time and acting as a senior, which I didn't think was ever going to happen!
> [P11: 1st Pilot, 3-month post module survey]

> I feel that I am a lot better equipped to investigate issues and I feel more able to discuss issues with my colleagues. [P9: 2nd Pilot]

> I have more confidence in my ability to do things on a professional level. I have been more keen to do a paper, and to attend conferences and seminars, and also to eventually have more involvement when we get our new equipment.
> [P11: 2nd Pilot; 3-month post module survey]

In fact, Participant 11 went on to present her learning experience in the 2nd pilot module at the 1st joint National Conference between New Zealand Institute of Medical Radiation Technology and Australia Institute of Radiography in August 2005.

Participation in the online module has provided participants with the confidence to pursue formal postgraduate education. Although the majority of participants have not engaged in formal postgraduate education since graduation, more than half of the participants felt confident in enrolling in some form of postgraduate education, as illustrated by the following comment:

> It [online module] has encouraged me to consider further study and has given me more confidence when presenting to other staff members. [P2: 1st Pilot]

As a result of participating in this module, three participants (P4, P11: 1st pilot and P10: 2nd Pilot) have formally enrolled in Masters programs.

Workplace Survey

In the Workplace Survey, six participants from the two pilots (35.3%) were reported by their supervisors to have made a positive impact on their workplace. This impact ranged from assuming an infectious attitude towards learning, willingness to share new ideas and solutions, willingness and ability to contribute towards departmental projects such as quality improvement studies and information technology developments. These participants were also proactive in advancing radiation therapy technique development in their workplace.

Reports from the Workplace Survey were outstanding for two participants. Participant 10's attitudinal and behavioural change has even resulted in her seniors realising that "they [supervisors] need to spend time with staff unfamiliar with complex training." In fact, her

seniors were “shocked” at Participant 10’s attitude of embracing challenges. The Supervisor noted as follows:

> I have noticed a change in Participant 10’s enthusiasm, towards RT planning. She is keen to learn (almost demands to learn new methods). This contrasts the way she was. She previously used to be a bit more apprehensive when challenged. [Supervisor of P10: 2nd Pilot]

The change in attitude and enthusiasm has in turn brought about a positive learning culture in her workplace, as the following comment illustrates:

> Participant 10 is a good role model in the workplace. Her positive attitude and willingness to learn of late has had a positive impact. Especially on the more junior staff and students. [Supervisor of P10: 2nd Pilot]

From ongoing communication with the participant, the researcher is aware that she was promoted to the position of Deputy Head a year after completing the module.

The researcher is aware that Participant 12 was instrumental in assisting the Department in proposing changes to her Headquarter Clinical Planning Committee. Her role in suggesting changes was illustrated by the following comment:

> [Participant 12] has been able to make evidence based suggestions with regards to our current practices and propose changes and present ideas to staff in meetings. [Supervisor of P12: 1st Pilot]

Participant 12 has assumed an active role in disseminating information she learned from the module through her department’s journal clubs, as well as making herself available to assist her colleagues in their online research activities. The Supervisor concluded with the following comment:

> I believe [Participant 12] has benefited both professionally and personally from the module. Her willingness to communicate ideas and source solutions has improved and her confidence in what she is doing has also increased. [Supervisor of P12: 1st Pilot]

Through the Workplace Survey, the 3-month post module survey and postings from the reflection postings, all participants reported that participation in the module had empowered them and assisted in their professional development. (See Appendices 5.20 and 5.21 for summary of Level 3 and Level 4 data of the 1st and 2nd pilot module respectively.)

In terms of the reflection in the MRS workplace, the ongoing discussions between participants and their colleagues have certainly raised their awareness of the importance of reflection. In addition, two participants opted to give presentations about reflections at their regular staff meeting. One presentation was about using "the reflections I have done for this course – as an historical stroll through my career" [P8's learning portfolio], while another presentation was about "Reflection within our RT department" [P2's Learning Portfolio]. Participant 2's presentation had immediate impact on her colleagues as it was followed with a lengthy discussion of "how we can reflect on our professional practice" [P2's Learning Portfolio].

As discussed, MRS practitioners do not value reflection (see Chapter 2, Section 2.4.1). This is evidenced in both the 1st and 2nd pilot module. Enhancing participants' ability to reflect was one of the two main objectives of the online module. In addition, the title of the online module was '*Reflection on Professional Practice*'. However, none of the 26 participants in the 1st or 2nd pilot module indicated enhancing reflection or wanting to know more about reflection to be one of their aims or expectations of participating in the module. This shows that reflection is not on any of the participants' learning agendas despite the upfront promotion that the online module is about reflection. In this respect, in terms of workplace impact, at the very least, the online module has succeeded in raising the MRS practitioners' awareness of the importance of reflection.

5.6 Second research phase: Conclusion

The online module, based on the radiation therapy discipline, was piloted twice via action research. An Action Research Team, consisting of the researcher and three radiation therapy facilitators, was formed. The online module had three main objectives; to enhance practitioners' ability to reflect, to increase their radiation therapy knowledge, and to empower participants. To avoid the possibility of tainting participants' reporting of learning outcomes, the last objective of empowerment was not mentioned.

The completion rate for the 1st and 2nd pilot was 58% and 71%, respectively. The online module was evaluated using Kirkpatrick's four level evaluation model, with multiple data collection strategies adopted to triangulate the data.

Level 1 reaction data, which focused on affective aspects of participants learning, were obtained via pre and post module surveys and conference transcripts. There were similarities in Level 1 data. Participants from the 1st and 2nd pilot module indicated that both radiation therapy topics and EBP activities were relevant. They enjoyed participating in the module and reported that the time invested was worthwhile. All participants, with the exception of one who preferred face-to-face learning, indicated they are prepared to enrol in a module with a similar format of online discussions. The level of support provided by the facilitators and the available resources were helpful. The feedback throughout the module identified concerns with time constraints and the considerable time participants devoted to the learning activities, especially on literature search and reflection on the literature.

In terms of Level 1 evaluation, two main differences emerged between the 1st and 2nd pilot module. First, the difficulties experienced by the 2nd pilot participants in accessing Blackboard and the electronic library database, resulted in the 2nd pilot participants rating technical access with a lower means score of 3.5, compared to 4.14 for 1st pilot participants. Second, the 2nd pilot participants were more responsive and supportive of one another as evidenced by the number of messages posted on the discussion forum and the higher average number of messages per participant. This greater level of interaction may have resulted in the 2nd pilot participants scoring a higher means than the 1st pilot in their understanding of radiation therapy topics. Likewise, it may also have contributed to the 2nd pilot participants' higher means score that exchanges on the discussion forum provided more exploration of issues than is otherwise possible with individual learning.

Level 2 evaluation focused on determining the type and extent of learning that has occurred. Content analysis of conference transcripts was used to evaluate participants' reflection and learning outcomes. Boud et al's (1985) reflective model was used as the conceptual framework for coding of conference transcripts for reflection outcomes. There were similarities between the two pilots. All participants in both pilots reported the initial level of describing, sharing and exchanging information and association. Most demonstrated integration, with only two participants from both pilots showing evidence of validation and appropriation. One possible reason why few participants showed the higher level reflective processes of validation and appropriation could be that the conference transcripts used only captured the end process of reflection rather than the continuum of participants' reflection. All participants demonstrated evidence of reflection outcomes, with action outcomes being the

most common form of manifestation. Examples included examining departmental practices with the aim of suggesting improvements and changes, using newly acquired information literacy skills to inform departmental practice and participating in mini projects in the workplace.

In terms of differences, all 2nd pilot participants (100%) were coded to be more expressive in terms of their emotions related to learning, compared to only two participants (28.6%) in the 1st pilot module. The higher level of interaction and the willingness of the 2nd pilot participants to engage with one another in reflective dialogues may account for the reason why the 2nd pilot participants had achieved a higher means rating in terms of their understanding in EBP activities. In contrast, 43% of the 1st pilot participants compared to 20% in the 2nd pilot module, reported an increase in their ability to reflect on professional reading. It is uncertain if the intermittent technical access throughout the 5-week period of the 2nd pilot module has impacted on the 2nd pilot participants' ability to reflect. The issue of how to assist participants to reflect more effectively is discussed in the next chapter.

Level 3 refers to behavioural change as a result of participation in the module. These changes ranged from changes in radiation therapy practice, changes in attitude and behaviour in the workplace. Data were obtained via the Workplace Survey, the 3-month post module survey and the EBP assignments.

The response rate for the Workplace Survey was 71% and 40% for the 1st and 2nd pilot respectively. With the exception of two participants who were reported to have shown no change, responses from the Workplace Survey showed evidence that participants were empowered as a result of participating in the module. They were reported to be enthusiastic, increased in confidence and displayed a positive attitude at work and towards learning. Changes in the form of radiation therapy planning included an appreciation of the complexities of radiation therapy planning with three participants continuing to implement changes and improvements to their planning as discussed in the forum. Other changes included engaging in literature search, assisting colleagues with online searches and actively seeking for new challenges at work.

The 3-month post module survey showed that for both the 1st and 2nd pilots, approximately 53% of the participants continued to reflect on the literature and engage in reflective practice

in the workplace. Another 53% continued to work towards their EBP activities by either presenting their EBP assignments or investigating various techniques to advance clinical practice.

The major difference between the two pilots lies in the EBP assignment. 40% of participants in the 2nd pilot module failed to identify the obstacles in their EBP implementation and failed to suggest the corresponding solutions while all participants in the 1st pilot were able to do so.

Level 4 examines the impact of participants' learning on the workplace. Data obtained via the Workplace Survey, the 3-month post module survey and their learning portfolios showed similar findings for the 1st and 2nd pilot module. Supervisors reported that participants had a varying degree of impact on their workplace. These included making EBP suggestions, participating in ongoing departmental projects, encouraging colleagues to participate in CPD activities and volunteering for information technology related projects. All participants were unanimous that as a result of participating in the online module, they were more confident in conducting discussions with colleagues, increased confidence in embarking on new tasks and added confidence and willingness in participating in formal studies.

In Chapter 6, the researcher reflects on the implications of these findings and concludes the chapter with the corresponding recommendations for the CPD educational framework, the MRS workplace and the MRS profession.

Chapter 6

Discussion and Recommendations

6.1 Summary of learning outcomes of 1st and 2nd pilot module

6.2 Research Question 1: What are the design features of an educational framework needed for a CPD program to assist MRS practitioners, who are entrenched in a protocol-driven workplace culture, to engage in reflective practice?

6.2.1 (a) How effective is the online learning module, embedded within an educational framework, in:

(i) assisting MRS practitioners to develop a culture of reflective practice in their workplace?

(ii) empowering MRS practitioners to 'think beyond the square'?

6.2.2 (b) Is it possible to address the development of broader lifelong learning attributes, in addition to those that are clinically focused in the MRS profession, in an online learning module?

6.2.3 (c) How does one balance the essential elements of an educationally sound online learning experience against the background of increasing financial constraints and technical infrastructure, and still have a program that is attractive to MRS practitioners and commercially viable for educational institutions?

6.3 Action Research Cycle 6: Reflect on and modify educational framework

6.3.1 Reflections on the educational framework for Continuing Professional Development

6.3.2 Reflections on CPD: Medical Radiation Science workplace and profession

6.4 Recommendations for Continuing Professional Development

6.5 Summary of Research Question 1

Chapter 6 starts with a summary of the learning outcomes of the 1st and 2nd pilot module as detailed in Chapter 5. The discussions of the online module focuses on addressing the overarching Research Question 1 (Section 6.2). Based on the discussions and reflections, suggestions relating to the educational framework for CPD and the implications for the MRS workplace and the MRS profession are presented. Chapter 6 concludes with a summary of Research Question 1.

6.1 Summary of learning outcomes of 1st and 2nd pilot module

A total of 17 participants (65.4%) successfully completed the 1st and 2nd pilot modules. All participants who successfully completed either of the modules were unanimous that the learning experience had a positive impact on their professional and personal development (see Appendices 5.15 and 5.16: Summary of Level 3 & Level 4 evaluation data of 1st and 2nd pilot

respectively). Based on Boud et al.'s (1985) model of reflection, all participants demonstrated evidence of reflection outcomes, with action outcomes being the most common form, followed by changes in perspectives and affective outcomes. Examples of action outcomes included examining departmental practices with the aim of suggesting improvements and changes, using newly acquired information literacy skills to inform departmental practice, and participating in mini projects at the workplace.

As a result of the shared learning experience with their online peers, participants came to the realisation that they are able to and can make a difference to the workplace. This appreciation of their own worth in turn empowered them to assume a more proactive role in the workplace, as evidenced by their postings on the discussion forum and their supervisors' responses in the Workplace Survey. All participants reported that they were more confident in their ability to critique and to reflect on the literature reading. Reflecting on the EBP discussions and EBP assignments convinced them that EBP is not the sole responsibility of oncologists and that radiation therapists also have an important role to play in advancing workplace practices. There was also evidence that participants were more confident in directing their own learning. As a result of their learning experience, all participants reported that they were more confident participating in online learning and undertaking formal education, with three of the seventeen participants proceeding to enrol in Masters study in 2005.

Participants' learning flowed to the workplace. The three-month post module survey showed that more than half the participants continued to read and reflect on the literature, and to engage in some form of EBP work such as exploring their EBP topic or choosing a new clinical issue for investigation. 80% of the workplace supervisors who responded noted a change in participants' behaviour with participants being enthused about their work, displaying a positive attitude and increased confidence. Because of their newfound confidence, participants were empowered to assume new roles and additional responsibilities that they had not attempted previously and were more proactive in participating in ongoing developments. One participant was cited as a good role model for students and junior staff, and her attitude prompted senior staff to reflect on and modify their own approaches towards teaching radiation therapy planning skills to junior staff.

All participants enjoyed their online learning experience. With the exception of one participant who decided that she still prefers face-to-face learning, all participants expressed

their desire to participate in the future in this form of collaborative online learning,. They appreciated the value of networking with likeminded practitioners. While acknowledging the disadvantages of online learning, participants indicated that the advantages of learning within a community of practice online more than compensates for any drawbacks (see Chapter 2, Section 2.4.2).

6.2 Research Question 1:

What are the design features of an educational framework needed for a CPD program to assist MRS practitioners, who are entrenched in a protocol-driven workplace culture, to engage in reflective practice?

Research Question 1, the overarching research question in the study, seeks to determine the design features of an educational framework for CPD that will assist MRS practitioners to engage in reflective practice. Set against a background of a protocol driven workplace culture, Research Question 1 seeks to address CPD more holistically by focusing on three questions.

The first question addresses the extent to which the online module, embedded within the educational framework, succeeded in assisting participants to engage in reflective practice. This question also examines whether the online module can empower MRS practitioners to 'think beyond the square' and to start pushing their professional boundaries. The second question investigates the extent to which the online module succeeded in developing participants' lifelong learning attributes. A reflective practitioner cannot maximise each learning opportunity unless he/she has the corresponding lifelong learning attributes to enable him/her to get the most out of each learning situation (Cheetham & Chivers, 2001b). Hence, the development of lifelong learning attributes were included in this online module. The final question centres on the implementation of the proposed educational framework. Specifically it explores how an educationally sound and effective CPD model can be financially viable within the increasing financial constraints and competition currently confronting education providers, with universities being the focus in the present study.

6.2.1 How effective is the online learning module, embedded within an educational framework, in:

(i) assisting MRS practitioners to develop a culture of reflective practice in their workplace?

The educational framework underpinning the online module included social constructivism, learner-centred learning, and situated learning, and uses the instructional frameworks of constructive alignment and Salmon's 2002 model of 5-stage teaching and learning.

Three learning and teaching theories namely social constructivism, situated learning and learner-centred learning, shaped the type of learning environment in the online module. As discussed in Chapter 2, Section 2.4.3, learning is a social activity, with participants actively engaging in collaborative learning and group reflection, and making sense of their new understanding in the midst of multiple perspectives. The success of the online module in bringing about the specified learning outcomes of increasing radiation therapy knowledge and enhancing reflection, under the umbrella of social constructivism, learner-centred learning and situated learning, were evident from data collected from the 1st and 2nd pilot module.

All participants indicated that they enjoyed and learned from the collaborative learning and the group reflection that took place on the discussion forum. Participant 1 commented on the advantage of collaborative learning while Participant 5 highlighted the advantage of group reflection, as the following comments illustrate:

> The usual difficulty of finding enough time is ever present, but not insurmountable. This difficulty is eased by working in a group such as this one, where we have all researched different topics and shared what we have learned. [P1: 1st pilot]

> By reading other people's reflections and recommendations I could see where I had gone wrong, or how to put things better. [P5: 1st pilot]

Another positive feature of the online module was the learning that occurred from the multiple perspectives from different clinical centres, as indicated by Participant 10's comment:

> I've found the support and variety of information that we have shared amazing too. I feel like I have had a snapshot of what is going on in breast planning across Oz, NZ and Canada!! [P10: 2nd pilot]

In line with adult learning theory, the topics and learning activities were designed to provide participants with a certain level of flexibility in their exploration of knowledge. Reflective practice is also sufficiently flexible to allow any aspect of practitioners' practice to be examined (Bolton, 2001). In this respect, the module was successful in providing that flexibility of learning as it enables participants to pursue their own areas of interest, as the following comment illustrates:

> Because we have had different aspects of breast techniques being discussed at the same time, it is possible to concentrate on your own topic, but still benefit from what others have learned in their chosen area. [P1: 1st pilot]

Learners' support in the form of scaffolding, modelling and coaching are essential in assisting participants to engage in knowledge construction (Cobb, 1994) (see Chapter 2, Section 2.4.6). Postings from the discussion forum showed that participants found the support available in the online module to be extremely useful for knowledge construction. From the reading resources, participants were able to "turn reflection into a structured thought process" [P1: 1st Pilot]. They found the hints and modelling on reflection particularly useful not only in providing them with a head start on reflection, but also in raising their awareness of the importance of reflection, as the following comments illustrate:

> I very much enjoyed reading the example on how to reflect on literature reading which applies also to many other things that we do and can reflect on. I am much more conscious of reflecting on all that I am doing at the moment because of this week and not doing things just because that is the way I or we have always done them. [P14: 2nd pilot]

> I feel that I have gained a better understanding of the process of reflection and how to use it. The insight into reflecting on an article will be very useful. [P11: 2nd pilot]

As discussed, situated learning takes into account the social and cultural aspect of learning and focuses on authentic problem solving in professional practice (Jonassen, 2001; Kearsley, 2000b; Lave & Wenger, 1991; Stein, 1998; Young, 1993). In the present study, reflection and learning occurred within a community of radiation therapy practice where practitioners shared and exchanged information about breast planning in radiation therapy. Because of the

authenticity and relevance of the issues discussed, Participant 5 felt that this form of collaborative and contextualised learning resulted in deeper learning than a conference attendance as the comment below illustrates:

> There was a chance for deeper learning than I experienced at conferences because of the variety of experiences everyone else brought to the discussion board. I went to a good head and neck conference last Friday, but there was stuff I din't [sic] need to know. But on this course everything was applicable and interesting, with the chance of almost instant feedback… [P5: 2nd pilot]

And for reflection to be meaningful, reflection needs be contextualised (Boud & Walker, 1998; Zeichner & Liston, 1996). Participant 9 reflected on how her different workplace experience has shaped her reflection of a nominated reading, leading to a vastly different reflection from other participants. As a result, not only had she learned from her own reflection of the literature, she had learned from her online peers' reflection and responses, thereby highlighting the value of social constructivism and collaborative reflection as the comment below illustrates:

> Reading all of the views on reflection has been an exercise on reflection in itself… I was very interested in the exercise of reflecting on the article. I have had very different experiences to Facilitator 2 in prostate tmts [treatment] and found that my reflections on the article "reflected" that. So not only was the article interesting but I learnt as much from Facilitator 2's and others' responses to it. [P9: 2nd pilot]

Thus, the researcher was successful in engaging participants actively in reflecting by adopting a social constructivist and situated approach to learning. The instructional framework of Salmon's 5-stages of teaching and learning and constructive alignment were also successfully integrated into the online module to support the social constructivist learning environment.

As discussed in Chapter 2, Salmon's instructional framework provided a safe and structured learning environment allowing participants to develop their learning progressively (Salmon, 2000, 2002a). In the present study, the moderator (researcher) and three radiation therapy facilitators assumed a facilitative and supportive role. More than half of the participants reported that they had developed a rapport with their online peers. They felt that they were learning in a safe and supportive environment and that they were part of this online community. Participant 10 compared her current online experience with another of her previous online learning experience, "I feel you are on your own for most of the [previous

online] course but the online component is very useful. Not anywhere near as interactive as OUR [current online] group, but reasonably supported". Feeling a sense of belonging to the online community, participants were able to share their opinions and learning in a risk-free and supportive environment, as the comment below illustrates:

> One of the things that have amazed me over the past 15 weeks is the amount of support and variety of information spread around. In a totally non-threatening way. We get so closed in our little RT departments I think that we often forget that there is a whole RT community out there that can help us solve our problems, even the little ones. [P9: 2nd pilot]

And because their online peers valued their opinions, participants were motivated and encouraged to learn and to engage actively with one another in reflective dialogues. Participants found the online discussions to be both addictive and motivating as the comments below illustrate:

> …it is easy to stay motivated when you are keen to log on to the discussion forum to see what others have thought of your input and the discussion that ensues. [P1: 1st pilot]

> …Most of the time I was lazy to open the web page, I realised that, but once I was online I was engaged for hours. It is a good experience with positive feelings. [P2: 2nd pilot]

> I also love Participant 5's comment that the course was addictive. Once started the minutes flew into hours very quickly. [P12: 2nd pilot]

Given the overwhelming negative online learning experience reported in the 2003 CPD Survey, the success of the present online module in engaging participants in online learning is all the more significant (see Appendix 6.1: Footprints of 2nd Pilot Participants). In the 2003 Survey, only 56% MRS respondents described their online learning experience as interesting, with 75% and 91% describing their online experience as frustrating and lonely experiences, respectively.

The provision of a successful learning environment is also dependent on the facilitation skills of the moderator and facilitators, and the design of the learning activities (see Chapter 2, Section 2.4.5). The importance of the moderator's role in supporting participants in their learning surfaced especially in the 2nd pilot, with the ongoing technical problems of accessing

the 2nd pilot module and library database over a 5-week period. All participants spoke of the importance of the moderator's role in this module as the following comments illustrate:

> I'd like to think that any on line course would give the kind of support that [the moderator] gave us because it made a big difference to sinking or swimming! [P5: 2nd pilot]

> I think the reason this course has been so succesful [sic] is because of all [the moderator's] and the facilitators' hard work. I don't think I would have had the enthusiam [sic] to keep going without the [moderator's] guidance and feedback. [P11: 2nd pilot]

Although none of the participants withdrew from the 2nd pilot module during the technical failure saga, there is no doubt that the intermittent technology problems had severely disrupted the pace of reflective dialogues and the learning progress of the participants. To minimise the disruption, the researcher, in her capacity as the moderator of the module, extended the 2nd pilot for a further two weeks in order to allow participants more time to complete their activities and EBP assignment. As one of the weeks coincided with school holidays, all participants, were highly appreciative of the break as it provided them with some breathing space as well as additional time with their families.

The two main learning objectives of the module were to increase practitioners' knowledge of radiation therapy planning and to enhance participants' ability to reflect in the workplace. Hence, in accordance with constructive alignment, the learning activities required participants to engage in a variety of reflection activities, including reflecting on radiation therapy literature, reflecting on their planning practices and engaging in reflective dialogues with their online peers. Learning outcomes of radiation therapy knowledge and reflection were assessed through their reflective dialogues, reflective activities, and EBP assignments, and from the impact of participants' reflection on their workplace practices.

Developing a culture of reflective practice in the workplace does not occur overnight. Rather, the culture of reflective practice begins with each practitioner, reflecting at an individual level and at a collective level. For the latter, the participants reflected collaboratively with their online peers as well as with their colleagues in the MRS workplace.

At an individual level, it is imperative that practitioners themselves are aware of what constitutes reflection, and the importance and relevance of reflecting at the workplace. The learning activities provided opportunities for participants to reflect on the meaning of reflection, the risk of reflection, and the relevance of reflecting in the MRS workplace. Participant 2 noted that their busy workload and fast pace of work demanded MRS practitioners to work to the task, leaving little time to reflect, as the following comment illustrates:

> I think the best thing I have learn't [sic] this week is to not take so much for granted. Take time out to think about why, when and how we do things. Being so busy I tend to concentrate on the doing and not so much on the theory. [P2: 1st pilot]

As the above statement reflects the situation in most MRS workplaces, discussions about frequency of reflecting in the workplace and how reflection outcomes impact on their work practices followed. Most departments do not set aside time for reflection and suggestions about how individual and group reflection can be formally incorporated into workplace were discussed. As a result of the reflective dialogues about reflection, the online module was successful in raising participants' awareness and understanding of the importance of reflecting in the workplace. This is evident in how participants shared their greater appreciation of reflection and their willingness to apply reflection in the workplace, as illustrated by the following comments:

> I must confess that I have usually taken reflecting for granted, which generally means that you only revise and analyse situations and events that have had some major impact on you. From doing this module so far I have gained a new respect for the value of reflection and hope to incorporate it more in my professional and social life. [P1: 1st pilot]

> Hi I think I too have taken reflection for granted. It's not something I've consciously sat down to do at work, and I tend to be one of the people that do things "because that's the way it's done." I'm hoping for this to change - in fact while thinking about our current breast planning technique I've come up with a question about tattoos I can't answer to my satisfaction. I'll quiz a few people when we return to work on Tuesday and see if I can come up with a satisfactory response!! [P11: 1st pilot]

As a result of participating in the reflective activities in the online module, participants began to incorporate reflection as part of their approach to work. Participants reported reflecting more regularly in their workplace, as evident from Participant 8's comment below:

> I not only get to reflect here online but also at work more and more as a result of this discussion. I find I'm reflecting on my motives for doing things a certain way - also a result of explaining to students this week…Reflection for me is also a matter of empathy - I reflect on the feelings of the patients and their families, colleagues and their motivations. I think this week has made me realize these things more acutely than before. [P8: 1st pilot]

Participant 8 also commented on how her own understanding of reflection had also impacted upon her colleagues. This reflected most of the participants' experiences, as the comment below illustrates:

> Reflection (although a clichéd buzz word) is extremely important to our profession -it drives our daily planning and treatment of patients and all our quality control…Well now I'm more aware and probably my immediate colleagues are now too. [P8: 1st pilot]

At a collective level, the culture of reflective practice in the MRS workplace was made possible when individual learning and reflection permeated to the workplace. This is evident from the postings on the discussion forum which showed that the learning and collaborative reflection were not restricted to participants' online community but had also extended to include their colleagues in the workplace. All participants were involving their colleagues in reflective dialogues at work by sharing their reflection, literature reading and informing and updating them on the online discussions. Participant 8 commented as follows:

> I had a lot of interest from my department in the whole idea of this type of online discussion forum. I would start talking about one topic which may have been mentioned in the discussion forums and it spark up further conversations. One thing with RT's [radiation therapists] there is never any shortage of opinions and passion for our work. Just sometimes there is a shortage of RT's ;-) [P8: 2nd pilot]

Participants sought input from colleagues and brought the workplace discussions back to their online peers. Thus, the reflective dialogues that started on the discussion forum, flowed onto the workplace and then looped back to the online community, as illustrated by the comment below:

> Many r/ts [radiation therapists] were really interested and they really helped me look at the practices in our dept. Everyone was keen to help me understand varios [sic] aspects of my EBP topic and the more questions I came up with set them to thinking and reflecying [sic] on why we do things [P12: 2nd pilot]

As explained in Chapter 2, Section 2.4.1, by involving their colleagues in such discussions, participants were also engaging their workplace colleagues in Schön's concept of reflection-on-action (Seale & Cann, 2000). Such exchanges marked the beginning of a culture of reflective practice in the MRS workplace.

Another way of facilitating and spearheading a reflective culture in the MRS workplace involved senior practitioners themselves gaining a better appreciation and understanding of reflection, as well as ideas on how to introduce group reflection into the workplace as part of team building. Participating in the online module has given Participant 8 ideas on how to apply and encourage collaborative reflection in his workplace, as illustrated by Participant 8's comment:

> I am beginning to feel that I need to think about how I will share the ideas and information I am gaining from this experience with my workplace. With a positive approach to reflection a workplace can grow as a unit. Through reading the article and the repsonses [sic] and thoughts posted here in the last week I also feel I have a whole new meaning for the word reflection and it doesnt [sic] involve a mirror ;-) [P8: 2nd pilot]

The strict adherence to protocol in the MRS workplace promotes conformity of practice and does not encourage regular reflection on workplace practices (see Chapter 2, Section 2.3.1). Being able to question and reflect on workplace practice is certainly a departure from the entrenched MRS culture of protocol. This explains why Heads of Department interviewed spoke of the importance of promoting and encouraging MRS practitioners to engage in EBP as "evidence based practice goes towards benefiting your workplace" [HOD7]. Of the eight HODs interviewed, half specifically indicated EBP as a useful avenue in introducing practitioners to questioning workplace practices and research.

So how did engaging in reflection in the online module change participants' adherence to workplace protocol? Data showed that the online discussions and EBP activities were successful in getting practitioners to question and reflect on their workplace practices. For instance, as a direct result of the reflective dialogues on planning practices, Participant 11 spoke of how she took the initiative during one of her plannings to modify the protocol, resulting in a 10% reduction in radiation delivered to the patient as the comment below illustrates:

> Although the plan I had produced was "acceptable" - I asked the senior RT [radiation therapist] checking my plan if it would be considered going "over the top" to add a lightly weighted 18X beam on the lateral to further reduce the hotspot in the axilla…It's such a grey area though - if I hadn't asked, the plan would have been accepted, and the patient would be getting an extra 10% in the axilla. If I'd asked another RT [radiation therapist], they may have thought the extra work required did not justify the end result. Maybe not... I'm just trying to think of alternatives! [P11: 1st pilot]

The impact of the EBP assignment on the protocol driven culture is also evidenced by participants' adoption of a more critical approach at work, as illustrated by Participant 4's comment below:

> I definitely have gained a lot from doing this assignment and the module. In realtion [sic] to my assignemnt [sic], I planned a young lady today and decided to omit the wedge on the medial field, instead using a larger wedge on the lateral and adjusting the weightings. Also the module has helped me look a lot more laterally at things be more inquisitive. [P4: 2nd pilot]

Facilitator 2 also noted in his reflective journal how the online reflective discourse has impacted on workplace practices, as illustrated by the following comment:

> It was extremely rewarding, however, to note that a simple point like not including medial wedges on tangents has emanated from this module and already impacted on department's practice around the world. Very cool to think, that patients are directly benefiting from this module, with information being feed back by participants. [Fac 2]

Participant 1 gave an example of how her enhanced critical thinking had allowed her to be more proactive in advancing patient care as illustrated by the following comment:

> I think working on the EBP (which I can't seem to get finished) has got me thinking more critically about other issues with breast and other treatments at work. Last week I was working on a new machine with dynamic wedging and MLC, where you would expect less scatter from the machine ... and I noticed a remarkable number of breast patients with a brisk skin reaction - something I haven't been seeing elsewhere. Despite having seen these patients daily, the usual staff on that machine wasn't concerned, and didn't notice a trend. I did mention it to our physicists however to see if there could be an explanation. We're planning on watching for notable skin reactions for patients on the new machines versus old, and we may do some TLD measurements to check the skin doses on patients

> with bad reactions. This is something I probably wouldn't have pursued before doing this module and project! [P1: 2nd pilot]

Perspective transformation is only possible if members are given the opportunity to construct and de-construct the social context in which they work (see Chapter 2, Section 2.4.1). Participant 12 was one of the participants who experienced perspective transformation. Realising that EBP is not just the responsibility of oncologists, but also of the radiation therapists, Participant 12 was able to demonstrate in her EBP assignment her understanding of the challenges facing EBP implementation in her workplace. Facilitator 2 was particularly impressed with her perspective transformation, as illustrated by the following comment:

> I know of Participant 12's department. It is extremely protocol driven, with a culture of "nati [sic]-change'. She has recognised this, is not perturbed by it, has thought through the [EBP] process required and has a great chance of implementing her change and procedure. [Fac 2]

Data from the Workplace Survey supported the postings on the discussion forum that participants' learning had an impact on their workplace. For instance, by the end of the module, Participant 12 was working with her senior-in-charge in putting forward a proposal for change in planning technique to their main centre Clinical Practice Committee. In addition, since completing of the module, Participant 12 has been working with a number of colleagues on her EBP project, testing a variety of techniques to stabilise large breast patients for radiation therapy treatment. As her Supervisor noted in the Workplace Survey, Participant 12's confidence has not only improved, but her ability to "communicate ideas and source solutions" had also increased. The Supervisor was particularly impressed how the online module had enhanced Participant 12's professional and personal development. Likewise, Participant 10 was also singled out by her Supervisor as being a good role model for students and junior staff in her workplace, with her Supervisor acknowledging that the senior management was "shocked" at Participant 10's transformed attitude towards embracing changes [P10: Workplace Survey].

Facilitator 2 reflected on the impact this module had on Participant 11 as follows:

> To give an example of the impact [this module] has had on one of the participants – she now is willing to offer an opinion at the unit audit, sharing the information and knowledge that was garnered through the online module. Further example is a patient on treatment recently who was prescribed a fractionation schedule different to the norm.

> Participant 11 conducted a literature search, researched the basis for the fractionation, and then presented to the whole department a synopsis of the article, in an attempt to open a dialogue with the prescribing radiation oncologist. The fact that she would never have had done this prior to the online module is a clear indication of the impact that it has had on her in the workplace. [Fac 2]

Against a workplace culture that promotes conformity and one that is protocol driven, evidence from both pilot modules show that the online module succeeded in assisting MRS practitioners to engage in reflective practice in the workplace. As a result of participating in the reflective activities, participants started to reflect at an individual and collective level. They adopted reflection as part of their approach to workplace practices and began to vary workplace protocols. In addition, by engaging colleagues in reflective dialogues, participants were also assisting in cultivating reflective practice in the MRS workplace.

The next part of Research Question 1(a) (ii) focuses on how the online module, embedded within the educational framework, succeeded in empowering practitioners to 'think beyond the square'.

6.2.1 How effective is the online learning module, embedded within an educational framework, in:

(ii) empowering MRS practitioners to 'think beyond the square'?

In designing the online module, the researcher specified two main objectives: to extend and consolidate participants' clinical knowledge and to enhance their ability to reflect in the workplace. Given MRS practitioners' apathy, low professional self-esteem and subservient mindset, the researcher also included a third major objective: empowering participants through reflection (see Chapter 2, Section 2.4.1). According to constructive alignment theory, all learning objectives and outcomes should be made explicit. However, for the purpose of the present study, the researcher decided against making the third objective explicit. This was done to avoid the possibility of influencing participants' reflection of their learning outcomes, thereby ensuring that any evidence of empowerment was a result of participation in the online module.

This question therefore seeks to determine whether the online module succeed in empowering MRS practitioners to 'think beyond the square'. For the purpose of the study, there are two definitions of 'the square'. First, given the workplace culture of strict adherence to protocol, the researcher defines 'the square' as MRS workplace protocol. 'To think beyond the square' refers to participants' ability to transcend beyond their strict adherence to the MRS protocols and to start reflecting on workplace practices with the aim of providing the best possible service for patients. As already explained, Research Question 1(a) (i), participants were questioning and reflecting on workplace protocols, engaging in literature search to better inform themselves and engaging colleagues in discussions, as well as modifying protocols to cater better to patients' needs. Thus, against a workplace culture of strict adherence to protocols, the online module was successful in empowering MRS practitioners to break away from protocol adherence and to 'think beyond the square'.

As discussed in Chapter 2, Section 2.4.1, empowerment and transformative learning are interlinked. The second definition of 'the square' refers to the transformative learning that occurs as a result of critical reflection (Brookfield, 2000; Cranton, 1996; Mezirow, 1990a). Transformative learning is about changing of perspectives and acting upon these new perspectives (Brookfield, 2000; Mezirow, 1990c). Thus, to 'think beyond the square' also refers to practitioners' changing their mindset of "you are only a radiographer" [HOD7] and abandoning their subservient attitude towards the medical profession. As a consequent, MRS practitioners would be more proactive in assuming increased responsibilities, which they otherwise would not have done prior to participation in the online module. Empowerment and increased confidence are necessary to enable practitioners to go beyond their self-imposed limits of achievements (Bolton, 2001; Ghaye & Lillyman, 2000; Schön, 1987). However, participants need first to be empowered and to have confidence in their own abilities before they can be expected to abandon their mindset.

One reason for MRS practitioners' low self-esteem and lack of confidence is their lack of appreciation of their own contribution to the workplace (see Chapter 2, Section 2.3.2). As discussed in Chapter 2, Section 2.4.1, learning to reflect on their workplace experiences assists practitioners in working towards appreciating their own professional expertise (FitzGerald & Chapman, 2000). Providing opportunities for participants to reflect on their workplace contribution and to claim ownership of their learning, allows them to be empowered in the process as illustrated by the following comment:

> It's been an incredible time - I've learnt that my opinion is valued and appreciated and that I can analyse and reflect on what I read instead of being told what to think. [P11: 1st pilot]

Participant 1 echoed the same sentiment when she wrote "all of our opinions are equally valid and have been listened to and discussed" [P1: 1st Pilot] while another felt more confident in her work as a result of the "increased conscious reflection" in the module [P1: 2nd Pilot]. In particular, the transformation of Participant 2 and Participant 12, from being tentative and shy in the beginning of the module to being confident, inquisitive, and motivated to adopt an evidence-based approach to work was evident [Facilitator 1].

As a result of undertaking the EBP assignment, participants realised that they were able to contribute to workplace practices, thereby making a difference in their workplace, as Participant 4's comment illustrates:

> I have a much clearer idea of EBP now, and hope to get more opportunity to use it in the department. I find I can think of lots of projects that I want to do! I think it is possible to make a difference - most of my colleagues are reasonably open-minded. I shall be giving them a presentation on this course in a few weeks, and hopefully I shall have some results of my EBP from this project by then. [P4: 1st pilot]

Empowered and with increased confidence in their ability to contribute to the workplace enabled participants to transcend beyond their negative mindset of "I am only a radiographer" and they began to be more proactive in seeing how they can contribute to advancing workplace practices. Facilitator 3 noted the effectiveness of the online module in bringing about empowerment of participants as the following comment illustrates:

> I don't think it was until this second module that I really started to notice that participants were getting involved in the workplace and getting other staff involved in finding evidence to justify themselves. It was great to hear that people were beginning to realise the importance of EBP. It only felt like a small beginning however these are often people who have not studied, let alone really been involved in facilitating change within their departments, you could see the realisation start to occur to them that they had the knowledge and skills to bring about these important changes. This was probably the most important thing that I think I saw some people get out of the program was a certain level of professional self empowerment. It was really gratifying to be a part of. [Fac 3]

Transformative learning allows participants to act upon their learning. The importance of acting upon CPD learning and new insight was highlighted by one of the HODs interviewed, when she spoke of the lack of CPD impact in the MRS workplace as follows:

> If they [MRS practitioners] go back to work after those [CPD seminars and courses], and they don't change what they do, if they don't reflect on what they learned, and say "maybe I can introduce this, maybe I can talk about change here, maybe I can institute change." If they don't do that, then they got nothing out of it. [HOD8]

Examples of transformative learning experienced by participants include perspective change towards CPD, workplace practices, EBP and increased confidence and enthusiasm towards formal learning (see Appendices 5.15 and 5.16: Summary of Level 3 & Level 4 evaluation data of the 1st and 2nd pilot respectively). Participants expressed that CPD and formal learning are not as difficult as they initially thought and are keen to participate in similar format of online CPD and formal learning in the foreseeable future, as illustrated by the following participants' comments:

> I have always felt CPD was important to me and now I'm participating in this course I am beginning to think it is even more so. I became more enthusiastic about CPD and decided to attend the conference that [Participant 8] organised… [P11: 2nd Pilot]

> …For me this has been a good introduction to the benefits on continuing education. [P14: 2nd Pilot]

While the MRS literature shows practitioners to be unwilling to accept increased clinical responsibility in the workplace (see Chapter 2, Section 2.3.2), there is evidence that the present online learning experience has transformed participants' attitude towards EBP and increasing clinical responsibility, as the following comment illustrates:

> I agree with Part21 that it is so easy to develop tunnel vision in Radiotherapy. This course certainly makes one realize how differently we all arrive at similar techniques but i guess it is the outcomes which are important! This is why evidence based practice and learning to research has been so interesting but frustrating at times to get definitive answers. The important thing that I have learned is that we should always strive for best practice and all that the concept embraces. [P14: 2nd Pilot]

Participant 12's perspective change on EBP is another example of transformative learning. She changed from indifference to one where she embraced EBP as part of radiation therapist's responsibility, as shown in the following comment:

> I didn't think much about EBP. I briefly understand what it is but thought this has more to do with the doctors where they have to keep up with all the clinical changes…I used to think it is not my problem. After reading the article, I found this is of everyone's concern. Technology is moving rapidly, if it is the doctors [sic] responsibilities to improve the treatment outcome clinically then I guess it would be the responsibilities of the RT to ensure this happen. Stablisation [sic] and optimisation of dose would be the areas that need to be constantly developed. Each of us has a role to play here. [P12: 1st pilot]

Upon completion of the module, as evidence of acting on her transformative learning on EBP, Participant 12 continued with her EBP project by working with her colleagues in testing and evaluating a number of breast stabilisation techniques for radiation therapy treatment.

As the MRS workplace is protocol driven, MRS practitioners are not encouraged to question and reflect on existing workplace practices, which in turn inhibits advancement of workplace practices (See Chapter 2, Section 2.3.1). As one HOD commented, MRS practitioners resist changes to workplace practices because 'I always have done it that way, why do I have to change?'" [HOD7]. As a result of her own transformative learning on CPD and EBP, Participant 12 saw the need for change in her workplace. She proceeded to endeavour to change the attitude and mindset of her colleagues by stimulating workplace discussions, as illustrated by the following comment:

> I have found the last 2 wks are very stimulating and interesting. I had stimulated a lots of discussions at my work place about how other centres plan breast techniques, and how I feel about involving in doing this online module…
>
> I have also posted the article that I found in the database to all staff at [my centre] to read, just to get my work mates to aware what happen out there. I so far have very possitive [sic] feedback. I strongly believe by the end of this module, [my branch] will have a proposal to the [Main Centre] Clinical Practice Committee about changes to the way we plan breast technique. [P12: 1st pilot]

Changes in participants as a result of reflection, can also have a positive impact on participant's colleagues and the workplace (Bolton, 2001; Ghaye & Lillyman, 2000). Participant 12 engaging her colleagues in literature reading and reflective conversations with

the aim of advancing workplace practices is one example of participants' learning having a positive impact in the MRS workplace.

Providing opportunities for participants to claim ownership of their learning by assisting them in knowledge construction is one way of empowering practitioners. The EBP assignment enabled participants to put into practice their learning, validating their newfound confidence. Transformative learning is the key to empowerment. Through critical reflection and reflective discourse, participants obtained new perspectives, which enabled them to 'think beyond the square'. Empowered and armed with newfound confidence and changed perspective, participants began pushing their professional boundary. They began to believe in their own capabilities and started to assume a more proactive role in the workplace, adopting evidence based approach to making suggestions. Abandoning the negative mindset and subservient attitude, participants started a literature search to keep abreast of the latest RT updates, while others started participating in ongoing department projects (see Appendices 5.15 and 5.16: Summary of Level 3 & Level 4 evaluation data of the 1st and 2nd pilot respectively).

The following comments encapsulate the impact of participants' learning in the MRS workplace:

> I feel like I'm in a much better position to offer input after this module. I also think I've gained some confidence in approaching our physics staff and senior RT's with ideas (i.e. removing medial wedges - moving younger patients to our newer machines). It was great to have a reminder that there are always new and interesting articles out there. Since we do work in an EBP environment, it's important that we keep up to dates ourselves and not just rely [sic] on the doctors to do so. [P1: 2nd pilot]

> Working on the EBP assignment has been inspiring - perhaps I'll never lead a trial in a prone breast board at our department, but there are always other opportunities. At the very least as [Facilitator 2] has reminded me, I'll be doing my very first presentation to the rest of the staff about this course - who knows, you might see me at my first conference next year as a presenter! Anything's possible :) [P11: 1st pilot]

Although Participant 11 did not present at the 2005 National Conference, she was one of the three participants who went on to enrol in a Masters program in 2005. Because of her increased confidence, Participant 11 also began to volunteer for tasks with increased responsibilities, something that she had not done prior to participation in the module.

Although differing opinions exist as to whether transformative learning should form part of the CPD pedagogical framework or part of CPD learning outcomes (see Chapter 2, Section 2.4.1), participants in the present study showed that transformative learning is an integral part of CPD learning for MRS practitioners. Evidence from the study shows that it is possible to bring about empowerment, transformative learning and reflection outcomes that go beyond just mere acquisition of clinical knowledge online.

6.2.2 Research Question 1b:

Is it possible to address the development of broader lifelong learning attributes, in addition to those that are clinically focused in the MRS profession, in an online learning module?

Historical, political and cultural factors make development of lifelong learning attributes amongst MRS practitioners a major challenge. The study by Sim (2000) shows that MRS practitioners are intensely focused on clinical knowledge. Although they regard both generic and lifelong learning attributes as important attributes for MRS practitioners to attain, much of this support is mainly rhetoric (Sim, 2000). Further evidence of MRS practitioners' inclination towards clinical knowledge is supported by the 2003 CPD Survey conducted as part of the present study. 79% of MRS respondents identified clinical modalities as their immediate learning needs, with only 18% indicating development of other attributes such as self-management, research competence, leadership and political and advocacy attributes as their learning priority.

Set against the background of political dominance by the medical profession, the subservient mindset of MRS practitioners and low professional self-esteem, both the Australian Institute of Radiography's Working Party and the majority of the eight HODs interviewed identified low self-esteem and general apathy as the major obstacles to MRS practitioners' professional development. The situation is further exacerbated by MRS practitioners' lack of take up of CPD activities due to the cost of CPD participation and lack of financial reward, in the form of higher salaries or promotion. As shown in the 2003 CPD Survey, there is a lack of support for mandatory CPD, with practitioners failing to recognise that participating in CPD is one of the core responsibilities of health professionals. This lack of enthusiasm for CPD makes the promotion of lifelong learning within the CPD framework all the more difficult.

A review of CPD programs and the publicity websites of MRS postgraduate education conducted by the researcher confirmed that while all MRS seminars, workshops and conferences, including MRS programs conducted by universities have a clinical focus, development of lifelong learning attributes was not featured as a major learning objective. Given the lack of emphasis on lifelong learning attributes by current CPD providers, MRS practitioners are likely to view any inclusion of development of lifelong learning attributes in CPD programs with scepticism. However, it is imperative that MRS practitioners develop the necessary lifelong learning attributes that will allow them to build upon their existing clinical expertise and to develop additional levels of competencies. Additional competencies will in turn enable them to assume a more proactive role in advancing healthcare practice and providing better quality care for patients.

So what are the lifelong learning attributes that will assist MRS practitioners in their professional development, and further enable empowered MRS practitioners to break the current historically, politically and culturally constrained impasse? MRS literature and data collected from the present study showed that the lifelong learning attributes relevant to MRS include confidence as a learner, the ability to be self-directed in his/her own learning, the ability to have an open mind as opposed to adopting a parochial vision, and information literacy skills.

Although MRS practitioners are generally confident and competent practitioners, their confidence only relates to their current clinical competencies. MRS practitioners generally lack the confidence to enable them to move beyond their existing pre-defined clinical roles. As one HOD of Department commented:

> But to take the initiative [of pushing the professional boundary], you have to have the confidence that you've got the knowledge…to get the knowledge, you have to do the reading… otherwise you can't talk confidently and you can't contribute confidently to any discussions about it. But you do have to overcome "Oh she is only a radiographer, what does she know?" [HOD8]

One way to bring about increased confidence is to assist practitioners to develop their information literacy skills, so that they are able to access, critique and reflect upon the latest literature. Being knowledgeable ensures they are able to contribute to workplace discussions and assume a more proactive role in advancing workplace practices. Practitioners must also

be self-directed in their learning, willing and motivated to learn and must have the ability to set themselves learning goals according to the needs of the workplace (Cheetham & Chivers, 2001a; Gross, 1977; Knapper & Cropley, 1991). The HODs interviewed also spoke of the need to prevent MRS practitioners from developing tunnel vision, but to provide opportunities in enabling them to see the 'big picture'. Including MRS participants as part of a community of practice online, opens them to a world beyond their current departmental practice and encourages them to move away from a parochial perspective. Moreover, enabling practitioners to network within their community of practice in turn helps them to enhance their interpersonal skills, another important lifelong learning attribute (Candy, 2000). Interpersonal skills are important because the ability to network with peers and engage in collaborative learning is an essential attribute of a multi-disciplinary health team (Sim, 2000).

Table 6.1 provides a summary of the lifelong learning attributes that will assist MRS practitioners to address the challenges currently confronting the MRS profession. In designing the online module, the researcher has incorporated the development of these attributes as part of the learning aims, learning activities and learning outcomes.

Table 6.1
Lifelong learning attributes that will assist MRS practitioners to address the challenges confronting the MRS profession

MRS literature and data collected from the present study showed MRS practitioners:	**Lifelong learning attributes to address the challenges identified in the present study:**
• have a significant level of apathy amongst practitioners	• Empowering practitioners to: • be inquisitive, motivated and willing to learn
• have a parochial view and failing to adopt the big-picture	• Acquiring the big picture (ie. ability to inter-relate fields of knowledge) by engaging in reflective dialogues as part of an online community of practice
• have low professional self esteem and lack of confidence to venture beyond their current roles	• Acquiring information literacy skills to assist practitioners in contributing to workplace discussions • Increasing practitioners' confidence as self-directed learners

The next section examines how the online module, embedded within an educational framework, succeeded in assisting MRS practitioners in the development of the lifelong learning attributes specified in Table 6.1.

Empowering practitioners to be inquisitive, motivated and willing to learn

Curiosity to learn and reflection go hand in hand as curiosity drives reflection (Ghaye & Lillyman, 2000). As Participant 12's comment that "this course helped to make me become more motivated and it makes me wanting to find out more about everything". [P12: 1st Pilot] echoed participants' opinion that the reflective activities had helped them to "look a lot more laterally at things and be more inquisitive" [P4: 2nd Pilot].

The literature search in the module also rekindled participants' curiosity for learning as the following comment below illustrates:

> I loved the challenge of the research and trying to express myself however I found I had to go back to a lot of basic planning technique books to get a handle on some of the principles covered in the articles. I didn't list all the articles I ended up reading because I found I would go off in a tangent that wasn't relevant to the topic but interesting to me! [P12: 2nd pilot]

Participant 12 also reflected on how important it is not to be "just a 'treater' because there are new techniques that really require more understanding" and this has in turn motivated her to read more articles than the minimum specified in the online module.

Participant 11 indicated that the literature search has not only stimulated interest in her work, but also motivated her to seek a deeper understanding in her reading, resulting in a sense of achievement as the following comment illustrates:

> I think this [online module] has been very worthwhile for me…The research got me interested more in my topic and gave me a better insight into what may be involved to introduce EBP. I certainly read the papers I used more thoroughly than I would usually. I also felt a sense of achievement at the end. [P11: 2nd pilot]

Excited by her new ability to conduct a literature search and in her desire to learn more from the RT literature, Participant 7 decided to enrol in an advanced literature search course to further enhance her skills as illustrated by the following comment:

> My time and effort has been rewarded by new found ability to research and critique literature… Just this week we had posted on our notice board an invitation from our library for interested people to attend to learn how to search journal and databases. Before this course I would not have accepted but now I want to learn how. [P7: 1st pilot]

Acquiring the big picture

Acquiring the big picture, also commonly known as 'helicopter vision', refers to the ability to inter-relate fields of knowledge as opposed to adopting a compartmentalised view of learning and tunnel vision (Candy et al., 1994). Participants indicated that the EBP activities and online discussions were instrumental in assisting them in acquiring the big picture. Participant 11 reflected in her Learning Portfolio that "the assignment assisted me to look at the big picture more", with an appreciation that any successful implementation of new techniques involves more than just technical details as it requires the support and collaboration of colleagues [P11: 2nd Pilot]. All participants enjoyed the exchanges on the discussion forum with one pointing out how such collaborative sharing and learning prevents practitioners from adopting a parochial view, as the following comment illustrates:

> I've really enjoyed participating in this module - although I was a little unsure at first. It has been great hearing about different practices in different centres - and different countries! Sometimes it's easy to develop tunnel vision and think your way is the best or only way to do something - in RT that's certainly not the case. [P1: 2nd pilot]

Acquiring information literacy

The importance of information literacy skills in raising practitioners' confidence and thereby enabling them to contribute to their workplace is illustrated below:

> I really agree when you said "I can still contribute a lot to my workplace and profession, simply by maintaining an interest in current research and sharing ideas with colleagues, both inter-department and between departments." Sometimes I have felt a little bit intimidated by what others have to say but now I feel my opinion will be valued if I can point to the evidence. [P2: 1st pilot]

Facilitator 2 was equally positive about the impact participants' information literacy has on the workplace as illustrated by the following comment:

> Overall the skills [information literacy and reflective skills] and the inter-department contacts that these participants will acquire means that they are now better armed to conduct literature searches, critically analyse literature, and share their thoughts on procedure within their departments. This is fantastic and if we get a few of them to look into post-graduate studies now that they have seen that they can do this, then the workplace, the participants and the patients all win. [Fac 2]

Participants reported increased confidence in speaking up and making suggestions in their workplace, allowing them to be more proactive in workplace discussions as the following comments illustrate:

> I feel like I'm in a much better position to offer input after this module. I also think I've gained some confidence in approaching our physics staff and senior RT's with ideas. [P1: 2nd pilot]

> I do find it easier to speak up at meetings and as mentioned above I am now involved in several committees that affect the way we do things here. [P1: 2nd pilot]

By being part of an online learning community and being better informed about other centres' practices, Participant 1 felt more confident and prepared to communicate with her colleagues and make suggestions at her workplace. She reported that she is also "doing more critical thinking at work" [P1: 2nd Pilot].

As discussed in Chapter 2, Section 2.4.1, given the importance of emotion on learning, it is expected that the positive feeling related to the online module would impact on participants' learning. For instance, Participant 11 reported that her newly found confidence had a positive impact on her subsequent CPD learning and also resulted in her being more proactive at work, as the following comment illustrates:

> …I became more enthusiastic about CPD and decided to attend the conference that [Participant 8] organised. I also felt more informed when I did attend the conference and the Varian users meeting and therefore got more out of them too. I now feel a bit more prepared and less apprehensive about the new technology we will be getting and more confident and enthusiastic about getting involved in its introduction I also think that I will now get more out of reading and appraising articles than I did before participating, and can now do literature searches too. [P11: 2nd pilot]

Facilitator 1, who visited one of the clinical centres, made the following observation about participants' professional transformation and impact on the workplace, as the following comment illustrates:

> The girls [Participants from 1st & 2nd pilots] have done wonders since they have finished, and have heaps more confidence in their ability. They were interviewed for jobs they would never have applied for in the past, have done presentations to the department about various issues, and used EBP to get a technique changed! [Fac 1]

Increasing participants' confidence as self-directed learners

Participants were unanimous that activities in the online module were well structured and yet sufficiently flexible to encourage self-directed and lifelong learning as illustrated by the following comments:

> Overall, I found this is a good self-directed learning class. How much you learn will depend on how much you have invested in it. It is a good form to encourage continuing propessional [sic] development and life long learning. I am now confident in knowing where to search for information and I have lots of little projects that I can do in mind. [P12: 1st pilot]

> The activities were interesting. I thought the course was as close as you could get to self-generated learning, which is supposed to be the best way for adults to learn…Although you start us off with a paper on a topic we can then find something related which interests us, so the direction is minimal. The EBP module we decide on ourselves, so we can find our own direction really. [P4: 1st pilot]

Considering that the majority of participants had nil or minimal online learning experience and few information literacy skills, as evidenced in the Pre-module Survey (see Chapter 5, Tables 5.6 & 5.11) and the extensive level of online support and guidance provided by the researcher, the online module succeeded in supporting them to assume increasingly more responsibility for their own learning. By the end of the module, with appropriate support, participants were confident enough to embark on an EBP topic of their own choice. As discussed in Chapter 2, Section 2.4.1, being able to assume responsibility for one's own learning is an important characteristic of an effective reflective practitioner (Baird & Winter, 2005; Bolton, 2001; Dewey, 1933).

The present study has shown that it is possible to support the development of lifelong learning attributes online. Qualitative data were supported by the quantitative data. On a Likert scale of 1 to 5, with 5 being strongly agree, mean scores for lifelong learning attributes ranged from 3.8 to 4.6, showing that participants were in general agreement that their lifelong learning abilities have been enhanced as a result of participating in the online module (see Chapter 5, Table 5.18). Certainly the online module was successful in motivating participants to want to learn, to be inquisitive and to be self-directed in their learning. Bolton (2001, p. 6) identifies this curiosity and motivation as "the sense of their relatedness to the professional" and is one of the greatest learning outcomes possible for any practitioners.

6.2.3 Research Question 1c:

How does one balance the essential elements of an educationally sound online learning experience against the background of increasing financial constraints and technical infrastructure, and still have a program that is attractive to MRS practitioners and commercially viable for educational institutions?

This section examines how education providers, specifically universities (see Chapter 2, Section 2.6), against the background of increasing financial constraints and technical infrastructure, can succeed in conducting a commercially viable and educationally sound online CPD program that meets the needs of MRS practitioners.

A CPD educational framework that is attractive to MRS practitioners and still commercially viable for universities should:

- be based on established theories of learning and teaching (Mcpherson & Nunes, 2004);
- provide authentic learning that meets the needs of MRS practitioners and workplace;
- involve the MRS workplace as a strategic partner in the CPD program;
- include a strategic plan that takes into consideration online infrastructure, ongoing technical support, academic staffing costs, university's mission and goals; and
- be sufficiently flexible to enable the CPD program to be replicated across a number of health professions.

The importance of having an educational framework that is informed by established learning and teaching theories is evidenced by the success of the online module in the present study (see Chapter 6, Section 6.2.1 & 6.2.2). However, the drive towards commercialisation of higher education means that the attractiveness of a program is no longer dependant solely on sound pedagogical principles. The present study shows the importance of providing authentic activities to keep participants motivated and engaged in their learning. Given the intense competition, employers are now in a position to demand that education providers tailor programs to meet the needs of the workplace while practitioners want authentic learning with input from the clinical sector (Wood et al., 2005). Thus, designing CPD programs that meet the needs of MRS practitioners is essential to ensure CPD programs remain viable, with sufficient numbers of practitioners enrolling in the program.

As discussed in Chapter 2, Section 2.4.3, aside from providing authentic learning experiences that address practitioners' individual learning needs, CPD programs should also include learning outcomes that enhance practitioners' other key competencies which address workplace needs. For instance, workplace learning requires practitioners to have well developed teamwork, lifelong learning and reflective skills (Ghaye & Lillyman, 2000; Perez, 2001). CPD programs that focus on such competencies encourage collective learning that in turn can assist the workplace to become a learning organization (El-Tannir, 2002; Fenwick, 2003). The online module piloted in the present study promotes workplace learning. This is because the module focused on reflection, collaborative learning and development of lifelong learning attributes, and assisting practitioners to develop their learning competencies collaboratively within a framework of learning community.

A CPD program is ineffective if participating practitioners are unable to apply their acquired learning in their workplace (see Chapter 2, Section 2.5.3). If the workplace is to benefit from practitioners' CPD learning, then provisions must be made to ensure that participants are able to act upon their learning in the workplace during and after completion of the CPD program (Ball, 2000; Boud et al., 1985; Kirkpatrick, 1998; Mezirow, 1990c). Thus, an essential element of an effective CPD model is to ensure that opportunities are provided in the workplace for participants to apply their learning.

To this end, the universities must work in partnership with the MRS workplace to ensure opportunities for participants to apply their learning are not left to chance. It should be pre-planned and designed as part of participants' learning activities. Both the teacher and workplace management need to consider ways that the workplace can provide the necessary support and opportunities to actualise participants' learning. Participants' learning needs should align with workplace needs and learning agreements should be established between participant, the workplace supervisor and the university. Although such a process carries with it an element of surveillance and may be perceived to reduce practitioners' professional autonomy, it is one way of ensuring management support for participants' CPD (Fenwick, 2003). By including the workplace as partners in CPD learning, the university is also leading the way in assisting the MRS workplace to systematically incorporate and align individual staff CPD needs within the workplace's strategic mission and competency framework (Moores, 2002).

The move towards consumerism in higher education means that consumer satisfaction is important and the need to cater to the needs of industry is essential for survival of universities' CPD programs (Bjarnason, 2004; Skolnik, 2000). To ensure that both individual practitioners and the workplace can gain maximum value from the CPD program, it is essential that universities form strategic alliances with the workplace by including them as partners in the conduct of CPD programs (Wood et al., 2005). By working in partnership with clinical centres, universities can create a special niche for their own survival, without losing sight of their traditional role of developers and disseminators of knowledge (Hagen, 2002). Such a strategic alliance, if successful, will reap enormous benefits for participating practitioners, the MRS workplace, universities and ultimately, patients.

Successful design of online programs is dependent not only on the teacher operating at the program level; success is also dependent on the teacher taking into consideration other institutional issues that impact on program delivery (Boettcher, 2004). In the next section the major issues that need to be considered when designing a online CPD program, namely online infrastructure, ongoing technical support, academic staffing costs and university's mission and goals are discussed, based on the experiences from the current study.

Infrastructure needed for online learning includes administrative services, information technology, ongoing technical support for online learning and learning resources (Boettcher, 2004). The teachers need to consider how this online infrastructure can be successfully integrated to support the online program in question. For instance, instead of relegating the electronic library database to one of many learning resources, the teacher should integrate the use of electronic resources into the learning activities with the aim of facilitating learners' understanding. Ensuring that learners are aware of the institution's online support and how to access it is vital in making online learning easier (Richards et al., 2004).

In view of the tight financial situation facing higher education, when selecting the technology for the educational framework, the researcher chose to use a well known course management namely Blackboard that is commonly available in most universities (Levy & Ramim, 2004; Richards et al., 2004). The use of such software reduces initial cost outlay. In terms of the learner cohort, the researcher was mindful that the majority of MRS practitioners are not familiar with online learning and hence selecting a technology medium that is user friendly is essential.

Successful implementation of new academic initiatives is only possible when team members hold the team leader in academic and personal respect (English, 2003). Although all three facilitators have experienced the traditional transmission form of online learning, the present online module, based on social constructivism and the concept of a community of practice, is a new concept for them. As such, it is necessary to provide leadership in leading the team forward. As part of action research, the researcher and facilitators worked collaboratively as team members, with the researcher subscribing to a collegial style of leadership, communicating regularly with the facilitators and adopting a persuasive and consensus style of decision-making.

Given the intensive nature of facilitation, it is essential to ensure that a high level of facilitation support is always available. An effective strategy is for the facilitators to work as a team. Thus, instead of having a single facilitator constantly 'available' throughout the 13-weeks, facilitators are only responsible for a specific period and revert to a supportive role for the remaining time of the module. This has the effect of spreading the workload amongst the three facilitators. This flexible team approach also enables facilitators to plan and balance their online facilitation roles with their other major responsibilities. Given that two of the three facilitators were senior practitioners with major responsibilities in clinical centres, this format of team approach is also a practical way of incorporating clinical specialists' expertise into CPD programs.

Since online facilitation requires a specific set of skills, considerable investment in staff development is crucial for success (Salmon, 2003) (see Chapter 2, Section 2.4.5). Prior to the conduct of the module, time was spent with the three facilitators explaining and discussing how the educational framework and the online module would be actualised. Since they were responsible for cultivating and developing a strong sense of learning community, it was essential for facilitators to share the learning and teaching approaches adopted in the educational framework, before they are able to adopt and apply facilitation skills. Regular meetings were conducted throughout the 1st and 2nd pilot module to review the module and to discuss the progress of participants.

The labour intensive approach to the online module inevitably contributes to higher staff cost, an important consideration in the current climate of budget constraint. However, the higher staff costs are justified as evidenced by participants' positive feedback on the quality of staff

support and their willingness to enrol in similar modes of learning. Providing a supportive learning environment is one way of increasing learners' satisfaction as the latter is a major reason for program success (Martz, Reddy, & Sangermano, 2004). Learners' satisfaction ultimately leads to a higher completion rate thereby ensuring the viability of the CPD program. The consequence of failing to provide a supportive learning environment is the surest and quickest way of bringing about the demise of any online CPD program.

In view of the high staffing cost involved in facilitating an online learning community, it is essential that the teacher must first solicit support from the Head of School to ensure that staff involved in the module are given the time needed to support and facilitate the program. Some senior academic staff may be of the opinion that technology is used simply as a means of transmitting information (Darby, 2002; Morphew, 2000) and therefore think that additional staff time is not required. The failure to solicit support from the School and Faculty has been identified as one major factor for the failure of online programs (Levy & Ramim, 2004). To this end, it is a good idea to ensure that the new online program supports the overall mission and vision of the university (Boettcher, 2004).

Designing and delivery of a CPD program to just one cohort of practitioners is not commercially viable (Robinson, 2004). Thus, to ensure that the educational framework is sustainable, the researcher proposes that the educational framework for CPD programs be replicated across different MRS disciplines and health science professions albeit with some variations to cater to the needs of different health practitioners.

6.3 Action Research Cycle 6: Reflect on and modify educational framework

This section focuses on the researcher's reflections on the CPD educational framework, the MRS workplace and the MRS profession, and how the framework should be modified based on the findings of the present study.

6.3.1 Reflections on the educational framework for CPD

Embedding assessment throughout the learning activities

On several occasions, a number of participants tended to gloss over reflection on the literature, concentrating simply on the critique of literature and technical issues. Despite the researcher's prompting, participants continued to ignore the reflective activities. This was confirmed by the fact that only 23% of participants indicated in the Post-module survey an improved ability to reflect on their professional reading. Likewise, a number of learning portfolios consisted simply of copies of participants' online postings with minimal reflections on their learning throughout the module. Although analysis of data showed that the rest of the participants (77%) demonstrated evidence of other reflection outcomes as defined by Boud et al.'s model and through their EBP assignments (see Chapter 5, Section 5.5.3), the lack of reflection on the literature needs to be addressed.

As discussed in Chapter 2, Section 2.4.1, learning through reflection is laborious and time consuming (Bolton, 2001; FitzGerald & Chapman, 2000), a view supported by participants in the present study. Thus, when hard pressed for time, participants may choose the easy way out by glossing over the reflective activities or resorting to the comfortable zone of factual discussions, rather than having to struggle with the ambiguity that is so often associated with reflection (Killion & Todnem, 1991; Tate, 2002). Due to the voluntary nature of participation in the online module, it was not feasible to 'enforce' the reflection on literature reading.

Thus, the researcher proposes that assessment be embedded throughout the learning activities. Assessment, in this instance, is used as a motivator, since learners attach value to assessment (Baird & Winter, 2005; Whittington, 2000). The purpose of the assessment is twofold; first to bring about a behavioural change in participants to ensure that participants do not gloss over certain aspects of reflective activities, and second, to provide both formative and summative feedback (see Chapter 2, Section 2.4.3).

However, there is a down side to making reflection activities compulsory and assessable. Seale (2000) reported that making learning activities compulsory for computer-mediated communication might have a negative impact on the quality of learning as learners' contributions to activities on the discussion forum that were compulsory were found to be shallower compared to those that were non-compulsory in nature. Voluntary discussions were reported to be more in-depth and knowledge based, thereby raising concerns that mandatory

assessable activities reduce the quality of learners' learning experiences, constraining their reflection and their contributions to the discussion forum (Baird & Winter, 2005; Seale & Cann, 2000).

There are no guidelines for the assessment of reflection (Sumsion & Fleet, 1996). The very act of assessment dictates setting of criteria, which, according to Boud, is inappropriate, as "effective reflective practice needs to be unboundaried" (as cited in Bolton, 2001, p. 83). There is a mismatch between reflection and assessment, since the nature of reflection requires one to question pre-suppositions and uncertainties and yet the very same reflective task is often being assessed for understanding of subject matter (Boud & Walker, 1998). Hence, education researchers question the value of assessment of reflection while others caution that the very process of creating assessment criteria will stifle the spontaneity of reflection (Beveridge, 1997; Sumsion & Fleet, 1996).

While assessment can inhibit learners from reflecting freely, the lack of assessment may result in them failing to pay sufficient attention to the reflective activities since they do not see them as a worthwhile exercise (Beveridge, 1997). Data from the present study shows that by not making elements of reflection assessable and compulsory, one runs the risk of having some participants glossing over certain activities. The solution may lie in adopting a three-pronged approach. First, teachers must design stimulating and challenging reflective activities, engaging learners in in-depth reflection so as to motivate learners to *want to engage* in reflection. Second, instead of assessing participants on their knowledge of subject matter, participants' work should be assessed against the criteria for reflection. This approach will avoid the predicament of expecting learners to explore the unknown (what they do not know) through reflection and yet assessing their knowledge of subject matter (what they know) (Boud & Walker, 1998). And last but not least, additional feedback needs to be provided via assessment. In this way, feedback is used as the final incentive in ensuring participants complete the reflection activities, thereby avoiding using assessment simply as a punitive measure.

Keeping a reflective journal as part of reflection

Although the reflective dialogues that took place on the discussion forum were extremely useful in extending participants' learning and in facilitating reflection, because of the transient nature of the discussion forum, there were times when in-depth reflection was not possible.

For instance, in the midst of the discussion, the agenda might be sidetracked by one participant raising another topic, causing the majority of participants to move on to the new topic. Moreover, the inherent characteristic of the discussion forum implies that at least two to three major themes may be being discussed simultaneously, making in-depth reflection of any one theme difficult. Also, the schedule of the module dictates that the class move on to the next agenda thereby leaving questions unanswered. As such, in designing an online module that uses reflective dialogues as one of the learning strategies, the designer should use the discussion forum as a platform for initiating and engaging participants in reflection, paving the way for subsequent deeper reflection in other reflective activities.

Learning activities that encourage reflection to occur in a more systematic form promote more effective and deeper reflection (Jay, 2003). For instance, a reflective journal results in more systematic reflection than reflective conversations (Jay, 2003). Rather than approaching learning on an ad-hoc basis as in reflective dialogues, reflective journal writing adopts a more structured approach, requiring participants to reflect regularly on their learning and progressively build on their reflection (Beveridge, 1997; Bolton, 2001; Boud et al., 1985; Schön, 1983). In fact, the reflective journal has been identified as the foundation of reflective practice and as a suitable framework for reflection to take place (Bolton, 2001; Cheetham & Chivers, 2001b).

However, the fact that the reflective journal is to be read by another reader, usually the assessor, may cause participants to censor their personal reflection thereby limiting the learning which might otherwise occur (Baird & Winter, 2005; Boud & Walker, 1998). To minimise this drawback, the researcher proposes that participants delete those sections that they consider personal and submit an edited version of their journals. In this way, participants are still able to engage fully in their reflective journal writing without compromising the quality of their reflection and learning. Although such an edited version of the reflective journal might be fragmented, it is better than no reflective journal at all. Another strategy is for the assessor to provide feedback on participants' reflective journals (Baird & Winter, 2005). This strategy also has the effect of providing another perspective to participants' reflection, preventing reflection from becoming too self-centred (Bolton, 2001). Further, many professional organizations, including the Australian Institute of Radiography, require members to keep a reflective journal as part of their CPD activities (Manthey, 2001). Having participants keep a reflective journal is an effective learning strategy that would also assist

practitioners in fulfilling their profession's CPD requirements. As such, it follows that a reflective journal should form an essential component of the reflective process of future online module.

Internalising participants' reflection process via a reflection model

There were considerable discussions in the online module about involuntary and subconscious reflection versus intentional and conscious reflection. Participants indicated that their reflection is involuntary and spontaneous. However, reflection that occurs in this way does not enable the learner to evaluate their learning or experience, and therefore does not result in decisions or actions that will impact on the learning (Boud et al., 1985). There was also confusion among participants between thoughtful action, reflective action and critical reflection. Throughout the online module, participants were encouraged to engage in critical reflection by reflecting on "the validity of presuppositions in prior learning" (Mezirow, 1990a, p. 12). Participants were encouraged to reflect on the reasons for their actions and workplace protocols. Thoughtful action involves "consciously drawing on what one knows to guide one's action" (Mezirow, 1990a, p. 6) while reflective action, or reflection in thoughtful action, requires the learner to critically "examine the justification for one's beliefs" (Mezirow, 1990a, p. 6). Some participants were under the impression that thoughtful action was reflection and were of the view that they were indeed reflecting in the workplace. Confusing thinking with reflection is a common problem with reflection activities (Boud & Walker, 1998). Thus, to avoid such confusion, it is essential for participants to be aware of the different types of reflection and to ensure that there are strategies in place to facilitate critical reflection and reflective action (Boud et al., 1985).

Different kinds of reflection and reflection model(s) that depict different levels of reflection should be introduced to participants as part of their learning activities in a future online module. Participants who are new to reflection can use such models of the reflective process as a framework for their reflection (Baird & Winter, 2005). An example of such a reflection model is Boud 1985 et al's reflection model, which was used for coding conference transcripts in the present study. Learning activities should be structured so as to provide ample opportunities for participants to reflect at different levels. Participants would then have to match their reflection in the online module and reflection episodes at the workplace to the reflection model. This process of matching reflection experiences to the reflection model would assist participants to identify and understand the various reflective processes that they

are experiencing and to internalise the reflection process. When using the reflection model in this manner, Boud and Walker (1998) caution against the danger of turning the stages in the reflection model into a checklist, with learners simply ticking off each stage in a mechanical manner. Hence, to avoid reflection from degenerating into a ritualistic exercise, participants would be required to reflect on how each stage of reflection corresponds to their learning as reported in the reflective journal.

Why is it so important for participants to internalise the reflection process? If MRS practitioners are to develop successfully a culture of reflective practice, they must first internalise the reflection process before reflective learning can become one of their learning strategies. Even in nursing, where there is an abundance of literature on reflection and where it is common for reflection to be incorporated into formal programs, reflective learning has still not been formally adopted as part of nurses' daily schedule (FitzGerald & Chapman, 2000). Thus, to get the most from reflective activities, participants must adopt a consistent approach to the process of reflection (Ghaye & Lillyman, 2000). Given that reflection is not an entrenched concept of learning for MRS practitioners, it is all the more important that every opportunity should be used to assist MRS practitioners to internalise reflection.

Incorporating cross-discipline involvement in CPD program

As part of situated learning and given the multi-disciplinary nature of healthcare, the researcher proposes that a future online module should have cross-discipline involvement, with nurses, physicists, oncologists and radiologists involved in reflective dialogues with MRS practitioners. These interactions would enable MRS practitioners to engage in collaborative learning with other health professionals, enhance MRS practitioners' professional self-esteem, and provide the much-needed opportunity to increase MRS practitioners' profile with other health professions (see Chapter 2, Section 2.3.2).

6.3.2 Reflections on CPD: MRS workplace and MRS profession

Although effective CPD learning is dependent on good educational design, successful learning outcomes are also dependent on the support provided for participants in their workplace and within the MRS professional community. Towards this end, this section outlines suggestions that would bring about a workplace that is more supportive of practitioners' CPD. It also explores the benefits of professional networking online in the

context of CPD and examines the benefit of making reflection more explicit in Australian Institute of Radiography's definition of CPD.

Securing workplace support through strategic alliances between universities and the MRS workplace

One of the major goals of CPD is for new learning to be successfully applied in the workplace, benefiting both individual practitioners and the workplace (Knox, 2000). Thus, in order for reflection to have an impact at the workplace, participants not only need to be supported to reflect during the online module, but they also need to be supported to reflect in the workplace (FitzGerald & Chapman, 2000). The need for workplace support in providing the catalyst for reflection is highlighted in the following comment:

> Reflection, for me too, is often because of an event at work however I think I reflect the most when someone else give me stimulus, which I have had this week [online].
> [P8: 1st pilot]

In addition, participants' enthusiasm for reflection will wane without adequate support in the workplace as illustrated below:

> I enjoyed the EBP module. Found it challenging. I think my workmates found it a little challenging too… Of course the next thing is what do you do with all this enthusiasm?
> [P9: 2nd pilot]

Practitioners shared their concern about maintaining the momentum of being proactive and keeping the enthusiasm going. "I think the hardest thing now is going to be continuing to push myself to make changes happen within the department" [P4: 2nd Pilot]. Participant 11 was fortunate enough to have a workplace where senior management is supportive of her CPD as the following comment illustrates:

> I only hope that I can keep the enthusiasm and the momentum going. [My senior] is helping this, having booked me to give a presentation on my topic in January.
> [P11: 2nd pilot]

Interviews with HODs show that CPD support in the MRS workplace is currently applied on an ad-hoc basis, which is largely driven by individual practitioners' learning goals. In order to ensure that CPD learning outcomes can have a definite impact in the workplace, a structured framework and effective partnership needs to be established between the MRS workplace and practitioners by directly linking practitioners' CPD goals with workplace goals (Owen, 2004).

Thus, the emphasis should not only be directed at designing relevant and authentic CPD activities online. As part of CPD planning, attention should also be directed at how workplace support can be structured to involve senior supervisors and colleagues in creating opportunities for CPD participants to apply their learning in the workplace. Unless this occurs, learning will not continue following completion of CPD programs and is unlikely to impact on workplace practices. As such, workplace support is fundamental to ensuring that participants' learning can be successfully applied at the workplace (Ghaye & Lillyman, 2000; Kirkpatrick, 1998). Hence, workplace culture can be either supportive or act as a deterrent.

There needs, therefore, to be closer collaboration between the university and the MRS workplace. As part of the CPD program, learning activities should be incorporated into workplace practices, with approval and support of the workplace management. This form of collaboration requires an innovative approach to assessment to incorporate authentic workplace assessment. Ideally, joint assessments can be conducted between the university and workplace supervisors, so that the workplace can claim ownership of the CPD program. Having an effective CPD program online is only the beginning. Without collaboration between the university and the workplace, even the most well developed CPD programs run the risk of compromising the enthusiasm, empowerment and learning of participants.

Support network via an online Community of Practice

The success of the reflective dialogues in the online module was evident when the online discussion spilled over to MRS practitioners in another state as the following comment illustrates:

> Participant 8, I agree on how there were some spirited discussions about some of the topics in our dept. I also spoke to r/t [radiation therapists] friends in N.S.W. [New South Wales] and got them thinking and dicussing [sic]. Maybe it would be a good idea to form some sort of online r/t forum [P12: 2nd pilot]

The above comment points to the need for some form of support network for MRS practitioners. Engaging in this form of learning network serves many purposes. It facilitates further learning and continues the form of supportive network provided by the online module that participants found useful (Cheetham & Chivers, 2001b). It can also contribute to MRS practice with the latest update from other clinical centres as illustrated by the following comment:

> I really think this [online discussions] is the way of the future especially with technology moving at the pace it is. To think you could link up the world with live chats and pose interesting topics and get answers from so many different departments. This would give your department up to date information on what's going on around the world. Anyway as you can see and I think most, if not all who participated in this module can see the advantages of talking to other RT's [radiation therapists] outside of your own department. [P8: 2nd pilot]

An online community of practice can also be used to reduce intellectual isolation experienced by many rural and regional practitioners as the following comment illustrates:

> …in our remote situation here in [this region]… it is good to be able to exchange ideas, hear what others do and generally communicate with someone different. It gives us a sense of being part of the radiotherapy community, not just an isolated little group down here. [P4: 1st pilot]

Networking online within a community of practice is also useful to guide and support remote-licensing operators, thereby fulling one of the professional's responsibilities, namely in helping other professionals to learn (Cheetham & Chivers, 2001b).

Traditionally, formal programs were designed so that learners interact only over duration of the program. With a virtual community of practice now a reality, it is possible to extend the support network and learning long after the completion of the program and beyond the workplace (Kearsley, 2000a). Such a community of practice has the effect of enhancing practitioners' problem solving skills and increasing their sense of professional worth (Distad & Brownstein, 2004). Online community of practice enables practitioners to "regularly and systematically reflect on their practice in a supportive, collegial environment free from evaluation" (Distad & Brownstein, 2004, p. 2). Thus, the formation of an online COP should be encouraged and supported.

Incorporating 'reflection' in the Australian Institute of Radiography's CPD definition

The Australian Institute of Radiography defined CPD as "ongoing maintenance and growth of professional excellence through participation in learning activities which are planned and implemented to achieve this for the benefit of participants, patients and the public" (Australian Institute of Radiography, 2004b, p. 35). Part of this definition states that CPD is "ongoing and life long", it aims at "active pursuit of professional excellence", benefits the

"participant, patients and the public", and should be "reflective of participants' active involvement in learning activities" (Australian Institute of Radiography, 2004c, p. 35).

Despite the importance of reflection in practitioners' professional development, there is no explicit expression in the CPD definition that reflection should be an *essential* CPD activity. Although the Institute recognises reflection on clinical practice as "highly valued within the new CPD program" (Guest, 2004, p. 9), by failing to explicitly include reflection as an essential component of CPD definition, to date the Australian Institute of Radiography has missed the opportunity to highlight the importance of reflection in practitioners' CPD. The researcher therefore suggests that the Australian Institute of Radiography should incorporate 'reflection' as part of its definition of CPD.

Based on the above reflections, the next section presents recommendations for CPD. Figure 6.1 presents the revised educational framework, with the recommendations highlighted in blue.

6.4 Recommendations for Continuing Professional Development

Reflecting on the participants' learning process and analysis of the learning outcomes points to the need to modify the educational framework. However, to restrict the recommendations to the educational framework alone would be limiting since CPD does not only impact upon participating practitioners but is also inextricably linked to the MRS workplace and the MRS profession. Since learning is a social process, it follows that both the MRS workplace and the professional community in which MRS practitioners work and interact, must also be considered. Thus, in order to bring about effective CPD learning outcomes, recommendations for the MRS workplace and the professional community are also included in the following discussion.

There are four main recommendations in relation to the educational framework. First, assessment should be embedded throughout the learning activities, to support the 'hard task' of reflection. However, care must be taken to ensure that assessment does not inhibit participants' reflection, and participants must be given ample feedback. Second, participants should complete a reflective journal as part of their learning activities and learning outcomes. Third, explicit presentation of a reflection model should be used to assist participants to

internalise the process of reflection in order to increase the likelihood of participants using reflection in the workplace. Finally, cross-discipline involvement in reflective discourse should be incorporated into the CPD program to assist MRS practitioners in raising their professional self-esteem and profile.

In terms of recommendations for the MRS workplace, it is imperative that the university forms a strategic alliance with the MRS workplace with the aim of providing opportunities to actualise participants' learning in the workplace. As part of the CPD program, learning activities should be incorporated into clinical practice to ensure participants' learning can be applied in the MRS workplace.

In order to highlight the importance of reflection in CPD, the researcher recommends that the Australian Institute of Radiography should explicitly incorporate 'reflection' as part of CPD definition. Thus, the CPD definition should read as follows: CPD is the "ongoing maintenance and growth of professional excellence through participation in learning activities, *and reflection on clinical practice,* which are planned and implemented to achieve this for the benefit of participants, patients and the public".

A support network for MRS practitioners in the form of an online community of practice should be initiated to support like-minded practitioners in their continuing learning and to facilitate professional exchanges between different clinical centres. Evidence from the study shows that participants and their colleagues are supportive of such an initiative.

The educational framework has been modified to reflect the above recommendations (see Figure 6.1). All recommendations are depicted within the CPD educational framework while the recommendation relating to the establishment of a support network, which is directed at the MRS professional community, is represented outside the CPD educational framework.

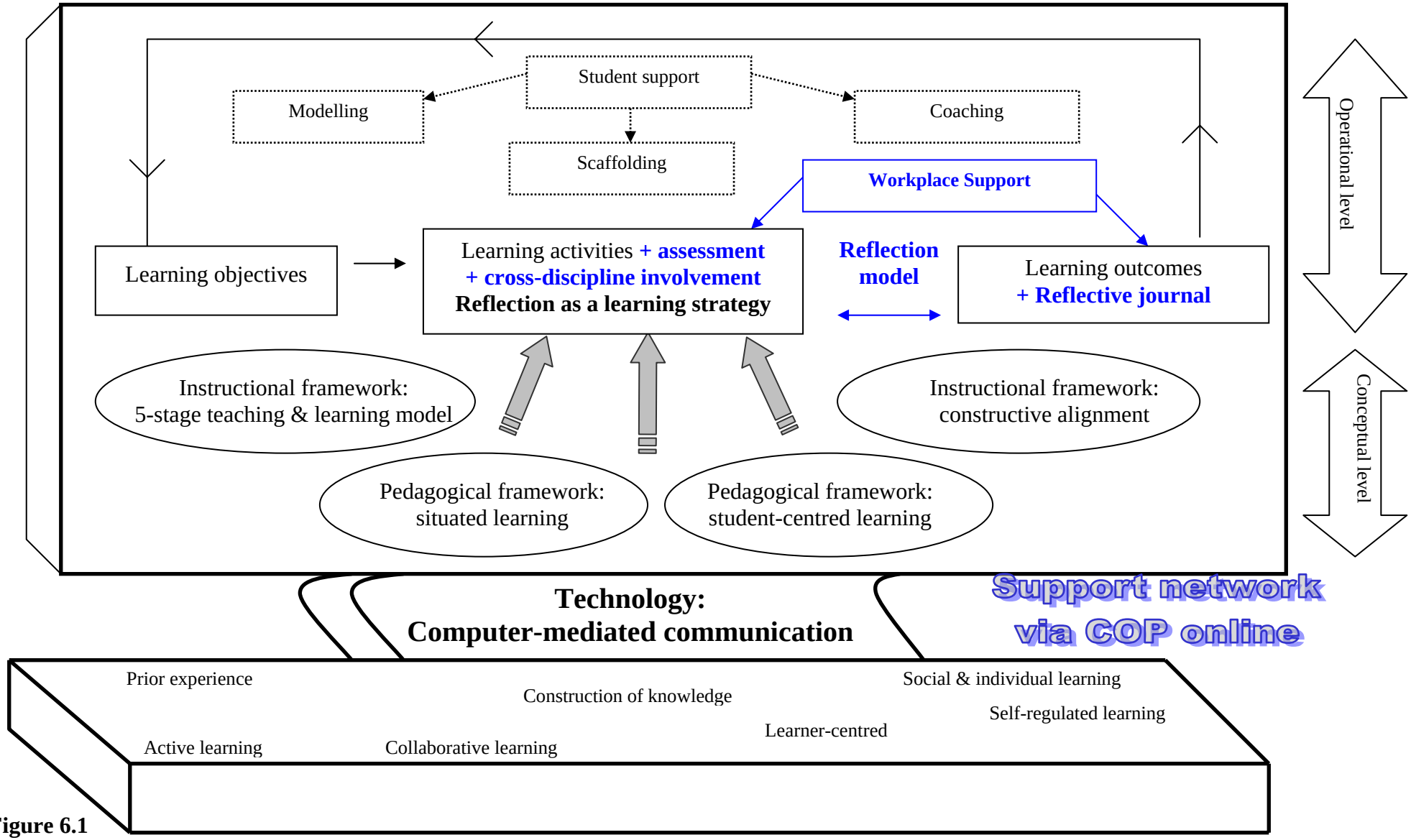

Figure 6.1

Revised educational framework underpinning the MRS online CPD program

Note: COP = Community of practice

6.5 Summary of Research Question 1

The online module, embedded within the educational framework, was successful in addressing the major challenges confronting MRS practitioners; namely the lack of motivation and an unwillingness to learn, unwillingness to accept increased clinical responsibility, and low professional self-esteem. By creating the appropriate context for reflection, it is possible to assist participants to engage in reflective practice in the workplace, empower participants and develop lifelong learning attributes online. Figure 6.2 presents the CPD learning outcomes of the online module.

The present study shows that it is possible to assist MRS practitioners to engage in reflective practice online. Participants were reflecting at an individual and collective level, both during the online module and at work, with reflective discourse flowing onto the workplace. Their ability to conduct literature searches, enabled them to adopt an evidence-based approach to modifying and advancing workplace practices. Despite a protocol driven workplace culture, participants began to reflect and question workplace practices, adopting a more proactive role in advancing patient treatment and patient care. Participants were motivated and committed to continue learning, which are essential characteristics of reflective practitioners. A culture of reflective practice was beginning to develop in the MRS workplace with participants' colleagues being drawn into reflective dialogues and participating in Schön's concept of reflection-on-action.

Participating in knowledge construction enabled participants to claim ownership of their learning. They found their own identities within a community of practice and began to gain a new appreciation of their contributions to workplace practice. The EBP assignment not only provided opportunities for participants to use their reflective and lifelong learning skills but also convinced participants that they were able to contribute and make a difference to the workplace. Feeling empowered and with renewed confidence and enthusiasm, participants began to assume increased responsibility in their workplace.

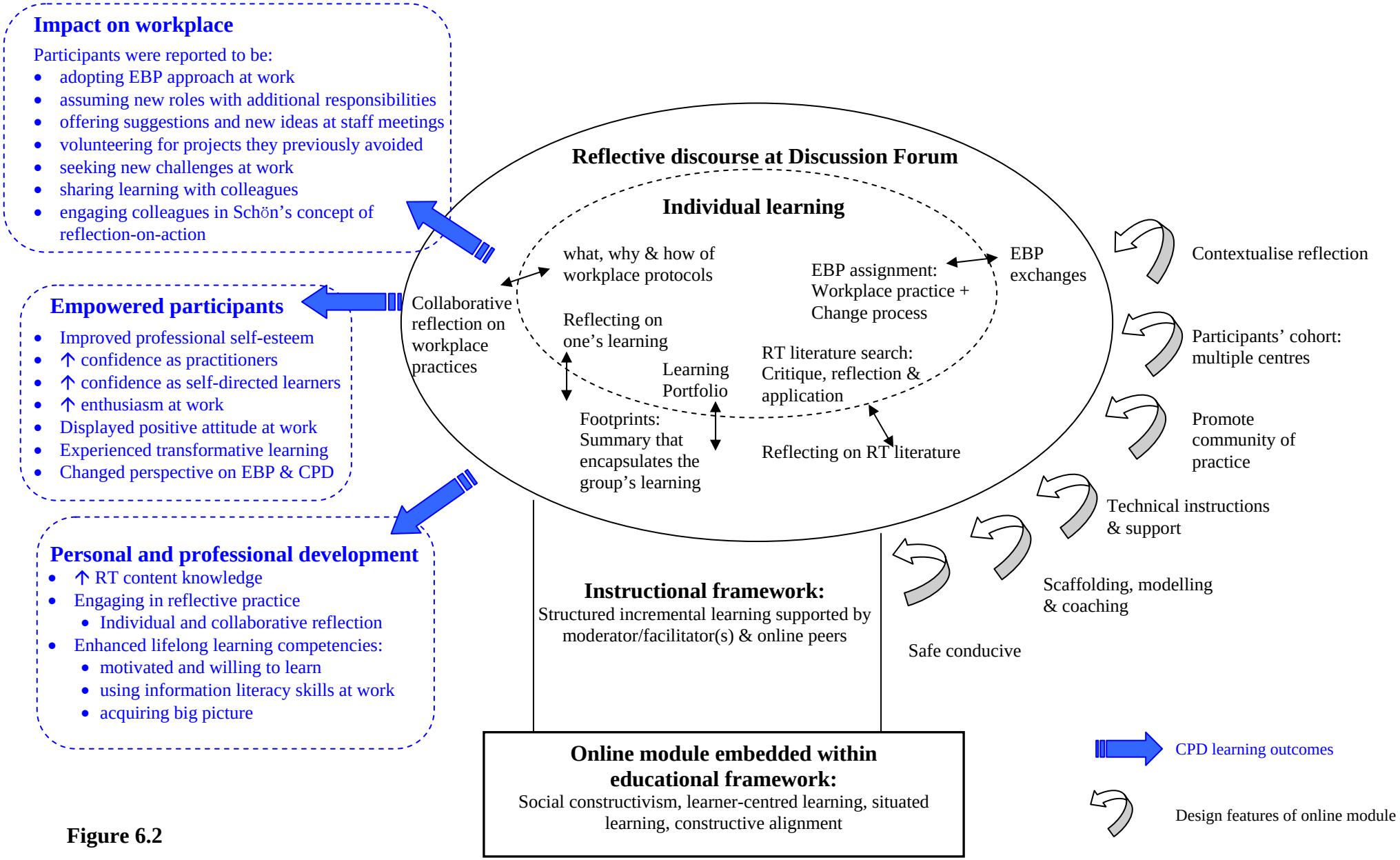

Figure 6.2

CPD learning outcomes of the online module

However, reflective practice and empowerment alone are not enough. It is just as important to assist participants to develop lifelong learning attributes and to experience transformative learning. The online module demonstrates that it is possible to develop lifelong learning attributes online by adopting a more holistic approach towards CPD. First, focus should be directed at developing lifelong learning attributes to support reflective practice. Second, the importance of creating a learning environment that addresses the affective aspects of learning is absolutely crucial in facilitating effective learning. Third, designing learning activities that allow participants to claim ownership of learning, facilitating discussions to bring about transformative learning, and providing opportunities for participants to actualise their learning in the workplace, are essential in bringing about empowerment and increasing participants' professional self-esteem.

To provide a commercially viable CPD model, the educational framework should be based on established learning and teaching theories and provide authentic learning that addresses the participants' and workplace needs. Aside from ensuring the framework is pedagogically sound, when designing a CPD program, it is essential for the teacher to take into consideration other institutional factors that will affect the delivery of CPD program such as online infrastructure, ongoing technical support, staffing costs and ensuring the CPD program is congruent with the university's mission and goals. In addition, there must be collaboration between universities and the MRS workplace, to provide opportunities for participants to apply their CPD learning.

In the final chapter, the researcher examines the strengths and limitations of the study, and makes suggestions for future research to expedite the design of effective CPD for the MRS profession.

Chapter 7

Conclusions

7.1 Strengths and significance of study
7.2 Limitations of study
7.3 Suggestions for future research
7.4 Summary of study

In this chapter, the strength and significance of the current study, its limitations, together with suggestions for future research to further the understanding, implementation and advancement of CPD for the MRS profession are presented. The chapter concludes with a summary of the study.

7.1 Strengths and significance of study

The MRS profession worldwide is exploring role expansion. The role of CPD in supporting MRS practitioners' move towards increased responsibilities is crucial to this study (Hamilton, 2005a; Henderson, 1999; Stevenson, 2000). The current study is timely in view of the current focus on mandatory CPD in the MRS profession worldwide. The introduction of mandatory CPD by the Australian Institute of Radiography in 2005 has given the present study added significance. Findings from the study will inform major MRS stakeholders, namely the MRS workplace, practitioners, the profession and CPD education providers, about effective CPD.

The study has several strengths including its methodology, its success in promoting a reflective culture in the MRS workplace, its contribution in providing principles and guidelines in bringing about effective online CPD programs that address the challenges confronting the MRS profession, and its holistic approach towards CPD within a community of practice framework.

One of the strengths of the study lies in the methodology used. Adopting a broad and integrative approach to the study of CPD in MRS in Australia, the study pools together various themes including CPD, professionalism, online pedagogy and reflective practice, and

integrating the above literature with the 2003 nation wide MRS needs analysis to design a postgraduate online education framework. In addition, the cyclical action of action research allows an inclusive and collaborative approach between MRS stakeholders, namely practitioners as learners, MRS academics and senior practitioners as facilitators of the online module. Given that this is the first major study about CPD in the MRS profession in Australia, the study will form the basis for other researchers to build upon.

The significance of the study lies in supporting the development of reflective MRS practitioners who are able to engage in evidence-based practice for the benefit of patients, the workplace and the MRS profession. The study has shown that it is possible to design CPD that has the power to change the current protocol driven workplace culture to one in which practitioners actively engage in reflective practice through CPD. For the majority of practitioners, this will necessitate a change of mind-set, from a task-focused approach, requiring little cognitive effort, to one in which practitioners are required to adopt a critical and reflective approach towards their clinical responsibilities.

The study demonstrates that the idea of the reflective practitioner in the MRS context is achievable within a typical computer-mediated communication framework. This is significant given the proliferation of online learning. Its success helps to pave the way for subsequent CPD programs. Since the start of the study, RMIT University has incorporated information literacy, reflective practice and EBP as part of its online MRS postgraduate programs; the researcher's advice and feedback influenced the structure, content and assessment of the reflective practice and EBP components.

The study identifies the essential principles and guidelines for effective and successful CPD programs. For CPD to be effective, CPD activities must address challenges that are currently confronting MRS practitioners, the workplace, and the profession, and must ultimately lead to better quality healthcare for patients. Results from the online module demonstrated that an effective CPD program can address the apathy prevalent in the MRS profession. Learning outcomes from the online module shows that it is possible to motivate them to want to learn, to increase their professional self-esteem and to be proactive in advancing their clinical practices for better patient outcomes. Given that apathy, low self-esteem and poor attitude have been identified as major obstacles in preventing MRS practitioners from advancing their

professional practice, these learning outcomes are significant in assisting MRS practitioners in taking the first step towards empowerment.

In addition, the study shows that outcomes of CPD can and should include positive workplace outcomes. The study demonstrates that the MRS workplace benefits from staff participation in CPD. As reported by supervisors in the Workplace Survey, participants in the online module had a positive impact on the workplace. With increased confidence, enthusiasm, increased information literacy and evidenced based skills, participants were proactive in advancing workplace practices, with patients benefiting from improved practices. Within a task-oriented, protocol driven workplace culture, participants are moving towards a higher cognitive level of critical and reflective thinking. It is only when CPD programs are effective in bringing about such transformative learning that MRS employers will see CPD as one of the means of attracting and retaining valued staff. The study, therefore, has implications for how the MRS workplace should formulate its CPD policy in the context of an effective learning organization.

The study also has the potential to change MRS practitioners' misconception about CPD. Being able to address misunderstanding during the initial period of mandatory CPD implementation is crucial if one is to avoid practitioners' backlash against mandatory CPD. Despite what most MRS practitioners believe, CPD is not simply about clinical competencies (Gold et al., 2002; Sim, 2000). As the current study shows, CPD is also about assisting practitioners in their personal development, such as the development of lifelong learning attributes, which will in turn enable them to build on their clinical competencies. It is about empowering practitioners and providing learning opportunities for practitioners to realise their potentials and putting their hidden capabilities to good use. Thus, for MRS practitioners who participate in such effective CPD programs, the personal and professional benefits can be enormous.

The study shows the importance of adopting a holistic approach towards CPD, by incorporating reflective practice, lifelong learning attributes and EBP within a community of practice framework. The study has demonstrated that it is possible to conduct educationally sound online CPD programs that are engaging and relevant for both MRS practitioners and the workplace. Moreover, the inclusion of an international cohort of MRS practitioners has provided participants of the community of practice an international perspective, showing that

the CPD framework can be successfully applied in the international context. The success of the CPD has implications on how universities can provide effective CPD programs and paves the way for universities to provide leadership in CPD programs for the MRS profession.

7.2 Limitations of study

The present study has a number of limitations relating to its design and methodology including the low responses to needs analysis study conducted in 2003, the voluntary nature of participation in the online module, lack of formal assessment in the participants' workplace and lack of a longer follow-up of the online module participants.

One limitation of the study was the low response to the 2003 CPD Survey, which was conducted as part of the needs analysis. A total of 450 completed surveys were received. As already discussed, the lack of sampling frame and the dissemination strategies adopted made it impossible to state the response rate (see Chapter 4, Section 4.1). Although 450 is a low number considering, that there are approximately 8000 MRS practitioners nationwide, the low response in this study is consistent with poor responses of other MRS surveys (Sim, 2000). Another limiting factor was financial constraints. The 2003 CPD Survey was made available only via the web and through major hospitals nationwide. With the latter, master copies were sent to the Departmental Heads, with requests for the Survey to be photocopied and distributed to MRS practitioners. Radiologists, who are the major employers of MRS practitioners, and health policy makers were excluded from the 2003 needs analysis as the researcher was unable to extend the data collection due to financial and time constraints. Despite these limitations, the data from the 2003 needs analysis triangulated with interviews conducted with HODs, the MRS literature, and the report of the Working Party from the Australian Institute of Radiography, thereby successfully informing the researcher in the design of the CPD educational framework.

The other three limitations namely, the voluntary nature of participation in the online module, lack of formal assessment in participants' workplace and lack of a longer follow-up of online module participants, were related to the present study being a PhD project. Due to the voluntary nature of participation in the online module, the researcher was unable to incorporate assessment into the module, and hence unable to assess the impact of assessment

on participants' willingness to engage in the module. It was also impossible to determine the impact of assessment on participants' willingness and ability to engage in reflective thinking. And, because participants volunteered for the study, it was inappropriate to formally assess their workplace performance as part of their CPD learning. In addition, the time constraint of the PhD study prevented a longer follow-up period of 6 and 12 months to determine the long-term impact of the online module. The researcher was only able to conduct a 3-month post module follow-up. However, in formal CPD programs, with careful planning and by working collaboratively with the workplace, it is possible to address the above limitations.

7.3 Suggestions for future research

The present study has raised a number of issues relating to CPD in the MRS profession that would benefit from further investigation. Future research could focus on:

- assessing the impact of assessment on participants' willingness and ability to engage in reflective learning. This includes assessing participants' workplace performance as part of their CPD learning. In particular, the study would include determining if the reflection outcomes can be sustained over a longer period of time;

- investigating the impact of cross-disciplinary involvement in MRS practitioners' CPD learning. In particular, the study would include assessing how cross-disciplinary collaborative learning impacts on MRS practitioners' appreciation of their contribution to healthcare as well as its impact on their professional self-esteem;

- replicating the study in other MRS disciplines and healthcare professions, in order to establish how the different political and social contexts impact on healthcare practitioners' ability and willingness to reflect. A detailed analysis should include suggestions as to how reflection can be contextualised to cater to practitioners' different learning needs.

7.4 Summary of study

The study aimed to investigate how CPD activities, through the development of a CPD educational framework, can assist MRS practitioners who are entrenched in a protocol driven workplace culture, to engage in reflective practice.

Action research was the methodology used in the study. The study was divided into two phases. The First Research Phase of data collection was used to inform the researcher of the needs of the MRS profession and the attributes that are necessary for the practitioners to meet these needs. It consisted of a national needs analysis on MRS practitioners' learning needs, role extension, CPD support in the workplace and MRS professionalism. Quantitative method in the form of survey and qualitative method in the form of semi-structured interviews were used. Data obtained confirmed the current MRS literature, namely apathy, low professional self-esteem, limited functional autonomy and the dominance of the medical profession resulted in MRS practitioners being unwilling to assume increased clinical responsibilities and lacking motivation to continue learning. Interviews with HODs also highlighted the need for MRS practitioners to question and reflect on workplace protocols if they are to advance workplace practices. But MRS practitioners need first to be empowered if they are to break away from the entrenched protocol-driven workplace culture.

The Second Research Phase of the study focused on the design and development of the educational framework for CPD. Based on current theories of learning and teaching, data collected from the First Research Phase was used to guide the design and development of the education framework. An educational framework that was learner-centred, based on social constructivism, situated learning and the instructional frameworks of constructive alignment and Salmon's 5-stage of moderating were adopted. Based on this framework, an online module was fully developed. The focus was on the learning processes, and the content driven by the learning needs of MRS practitioners. Reflection is an effective learning strategy in assisting practitioners in adapting to rapid changes, advancing workplace practices and in examining their professional values, ethics and beliefs. Given MRS practitioners' low self-esteem and lack of confidence, it was appropriate to incorporate reflection as part of CPD for the MRS profession. The online module had two main objectives, namely to increase participants' knowledge in breast planning in radiation therapy and to assist participants to engage in reflective practice. The third objective of empowering practitioners was not

explicitly stated to avoid tainting participants in their reflections and reporting of learning outcomes. The cyclical process of action research was used to pilot the online module twice with a group of volunteer radiation therapists. The 1st pilot participants were from the state of Victoria while 2nd pilot participants were from Australia, New Zealand and Canada.

The online module was evaluated using Kirkpatrick's four level evaluation model namely, reactions (Level 1), learning (Level 2), behaviour (Level 3) and impact (Level 4). Level 1, which explored participants' affective aspects of learning, showed that participants found the learning activities to be relevant and addressed their learning needs. They enjoyed the learning experience and would enrol in similar format of reflective and collaborative learning online. Level 2 evaluation examines the type and extent of participants learning. Based on Boud et al.'s reflection model (1985), participants showed evidence of action, affective and perspective outcomes. They also demonstrated successful development of lifelong learning attributes such as enhanced information literacy skills, ability to acquire the big picture, increased confidence as self-directed learners, and the motivation and willingness to learn.

Level 3 refers to behavioural change as a result of participating in the module. Participants were more proactive in offering suggestions in the workplace, they engaged in literature search, they shared their learning and engaged their colleagues in collaborative reflections, they sought new challenges at work, they assumed new roles with increased responsibilities which they would not have undertaken prior to participating in the module and they advanced workplace practices by adopting evidence based approaches. These changes contributed towards a culture of learning and reflective practice and had a positive impact on the workplace.

Level 4 measures the impact of the learning on participants' personal and professional development. These included increased understanding of radiation therapy knowledge and enhanced reflective practice and lifelong learning competencies. As a result of engaging in critical reflection, participants experienced transformative learning as evidenced in their adoption of EBP approaches. Participants were empowered as they began to value their professional expertise and started to believe that they can make a difference to their workplace and are capable of advancing workplace practices.

Based on the outcomes of the two pilots, four recommendations were made. Assessment of reflection should be embedded throughout the learning activities. However, given the sensitivities and difficulties of assessing reflective activities, care should be taken to ensure that assessment strategies adopted do not stifle reflection. A reflective journal, and reflection model should be used to promote a more systematic approach to reflection and to assist participants to internalise reflection. Finally, incorporating cross-discipline involvement in reflective discourse as part of CPD program will assist MRS practitioners in engaging with the wider healthcare professional community.

To highlight the importance of reflection in CPD, the Australian Institute of Radiography should incorporate 'reflection' as part of CPD definition. In terms of recommendations for the MRS workplace, universities should include the MRS workplace as a strategic CPD partner, with the aim of formally structuring learning opportunities in the workplace to enable participants to actualise their CPD learning. In line with Lave and Wenger concept of community of practice, an online professional network should be established to support MRS practitioners to engage in reflective dialogue. Such a support network brings together likeminded practitioners to encourage one another in advancing workplace practices. However, the issue of how each practitioner can learn to assume the role of an active, supportive member of an effective community of practice or as a good facilitator must be addressed but these are issues beyond the scope of the study.

Figure 7.1 is a summary of the study, and presents the design features of the online module, CPD learning outcomes and recommendations for the study.

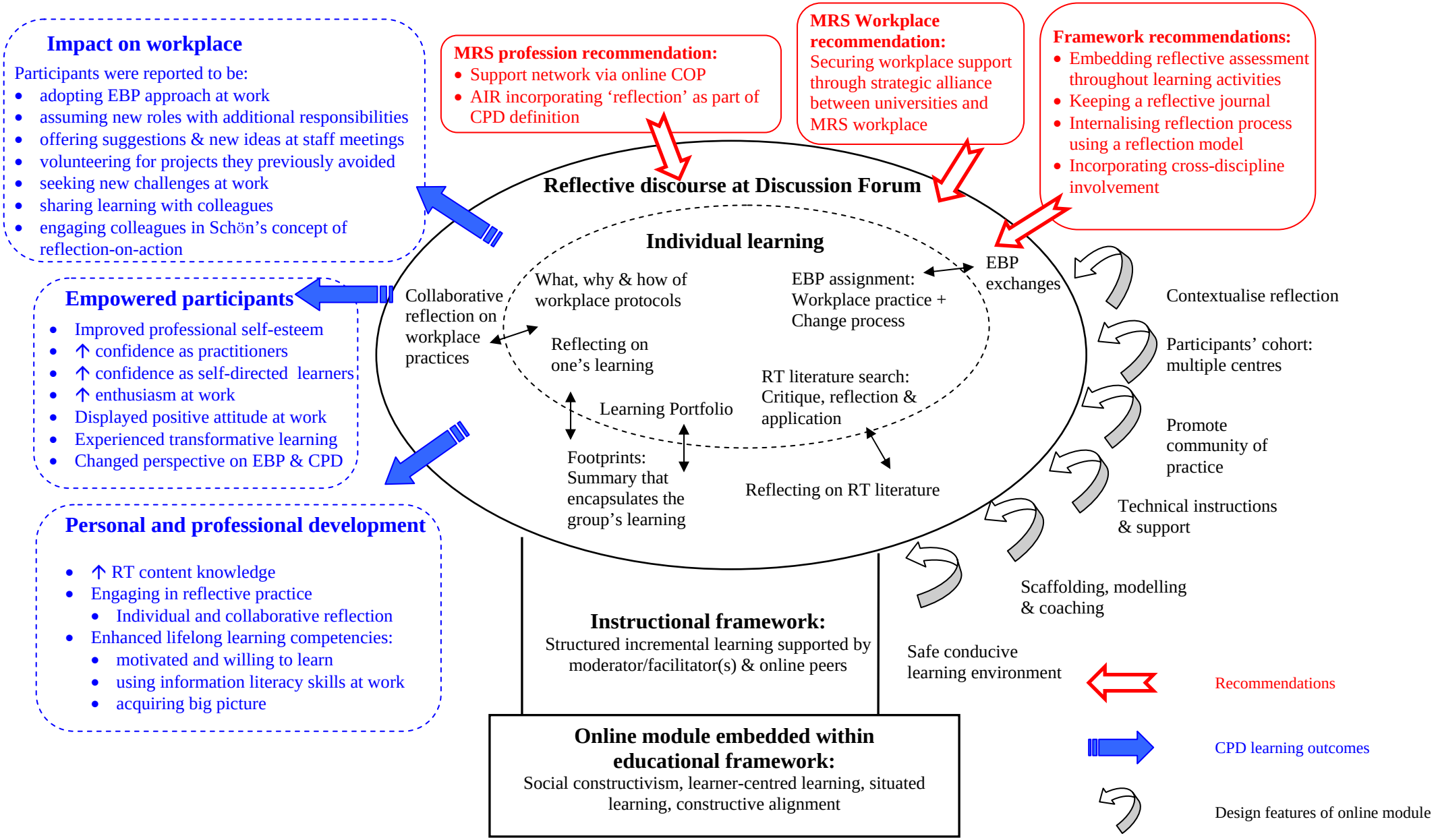

Figure 7.1 ***Summary of the study: design features of the online module, CPD learning outcomes and recommendations for the study***

Universities are in a position to play a leading role in providing CPD programs focusing on reflective learning based on a community of practice framework. To make the CPD program financially viable, aside from ensuring the framework is pedagogically sound, it is essential for the teacher to take into consideration other institutional factors such as online infrastructure, ongoing technical support, staffing costs, in order to ensure that the CPD program is congruent with the university's mission and goals.

The present study shows that it is possible to assist MRS practitioners to engage in reflective practice within an online module based on a CPD educational framework. The online module has resulted in participants contributing towards a reflective and learning culture in their workplace. By engaging their colleagues in the online discussions, both participants and colleagues were engaging in Schön's concept of reflection-on-action. And, despite a workplace culture that encourages protocol adherence, participants began to question, reflect and advance workplace practices. Participants were motivated and committed to continue learning, essential characteristics of reflective practitioners. With their positive attitude towards learning and their increased confidence in engaging colleagues in workplace discussion, participants are also playing their part in promoting a lifelong learning culture within their workplace. Such promotion of individual and collaborative learning benefits both the MRS workplace, the MRS profession, and ultimately, the patients. The educational framework has potential to be extrapolated to CPD programs in other MRS disciplines and other healthcare professions for similar benefits.

In conclusion, the present study has demonstrated the role and importance of reflective practice, lifelong learning and transformative learning in CPD. It has presented an educational framework that adopts a holistic approach towards CPD, by incorporating reflective practice, lifelong learning and transformative learning as part of CPD aims, activities and outcomes.

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Appendices

Use 15 minutes to have your say on

Continuing Professional Development
in
Medical Radiation Science

Aim

For any profession to remain relevant in these rapidly changing times, it is essential that graduates and practitioners be adequately prepared for the future (Candy, 2000). The aim of this survey is to establish the future needs of the Medical Radiation Science (MRS) profession and the attributes that MRS practitioners need to meet these needs (*MRS practitioners here include radiographers, radiation therapists, nuclear medicine technologists and sonographers*).

Outcomes

The information you provide will assist in shaping continuing professional development (CPD) of the MRS profession by:

- identifying the attributes (*ie. characteristics*) that ***you*** think are important in the performance of your current and future duties as a MRS practitioner
- informing the MRS community of ***your*** views on CPD and the future of the profession

The significance of this study lies not only in its contribution to the knowledge domain, but also in its practical outcomes for MRS practitioners, the MRS profession and academic institutions. Both qualitative and quantitative approaches will be used to collect the data. This survey forms part of the quantitative approach. Data obtained from this survey will assist in the design and development of an educational framework for CPD in MRS profession. One of the tangible outcomes will be the development of an online program, which will assist practitioners to develop those attributes that have been identified as essential in meeting the future challenges of the MRS profession. The availability of such programs provide practitioners with opportunities to develop relevant attributes which will empower them, enabling them to have increased control over their own situation and therefore play a role in determining the future of the profession (Greenwood & Morten, 1998) and improving services to our patients.

Availability

The survey will require approximately 15 minutes of your time. You can complete the survey on the web or on paper. **The survey is available on the following url: http://cpdsurveymrs.com** You can also access the survey via the following websites: AIR, ASA, Centre for Magnetic Resonance and The Adelaide MRI Website. If you prefer to complete the survey on paper, it can be downloaded from the website. Alternatively, hard copies of the survey can also be obtained directly from AIR State branches or the researcher.

Confidentiality and findings

Your responses will be treated in the strictest confidence. All data obtained will be reported only in an aggregated form, so that it will not be possible to identify individual responses. Information provided will not be made available to any individual or organisation. Data collected will be stored for a 5-year period, with the researcher responsible for the storage and security of the data, after which all data will be destroyed. (Hard copy will be shredded and electronic data, including all back up, will be deleted.)
Results from this survey will be reported via conferences and paper publication as soon as all responses have been analysed.

In order to obtain an accurate broad range of views, it is important that ***you send in your response***. Your participation is highly valued and greatly appreciated.

It would be greatly appreciated if you could return the completed survey before 30th June 2003. Thank you for your cooperation

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Section A: Background Information *(Please circle the appropriate number)*

1	**Gender**	Female	1		
		Male	2		
2	**Age group**	20-29	1		
		30-39	2		
		40-49	3		
		50-59	4		
		60 and above	5		
3	**Are you currently?**	Employed full time	1		
		Employed part time/casual	2		
		In full time study	3	*(Go to Section B)*	
		Retired	4	*(Go to Section B)*	
		Other	5	*(Please specify)*	
4	**You are currently working in:**	Australia	1	*(State)*	
		Overseas	2	*(Country)*	
5	**Current status** *(Please select one)*	MRS Practitioner	1		
	(ie. most hours spent on main job)	Clinical tutor	2		
		Head of MRS Department	3		
		Academic	4	*(Go to Section B)*	
		Other	5	*(Please specify)*	
6	**How many years have you been practising as a MRS practitioner?**				
		PDY/Intern year	1		
		Less than 5 years	2		
		5-10 years	3		
		11-20 years	4		
		More than 20 years	5		
7	**Your employer is**	Public	1		
		Private	2		
8	**Indicate the work environment in which you are currently employed**. *(Select only one)* *If you are working in two or more centres, select the one that occupies most of your working hours.*				
	Metropolitan:	Public hospital	1		
		Private hospital	2		
		Private clinic	3		
	Regional/Rural:	Public hospital	4		
		Private hospital	5		
		Private clinic	6		
		Other	7	*(Please specify)*	
9	**Indicate the approximate number of employees in your MRS department.***)*				
	(Includes, nurses, receptionists MRS practitioners, radiologists etc)	10 and less	1		
		11-20	2		
		21-50	3		
		Above 50	4		
10	**Indicate the main area that you are currently working in**				
	(Select only one)	Radiography	1		
		Radiation Therapy	2		
		Nuclear Medicine	3		
		Ultrasound	4		
		Management	5		
		Other	6	*(Please specify)*	

Section B: Meeting current and future challenges – attributes of MRS practitioners

Answer the questions by circling the appropriate number.

1 Literature has shown practitioners in health professions need to prepare for future challenges. From the list of attributes below, rate each item in terms of importance for: (i) current practice (ii) future practice (in 5 years time)

Attributes		Level of importance				
		Unimportant		Important		Very Important
Computer literacy	Current	1	2	3	4	5
	Future	1	2	3	4	5
Clinical competence	Current	1	2	3	4	5
	Future	1	2	3	4	5
Creativity and innovation	Current	1	2	3	4	5
	Future	1	2	3	4	5
Multi-disciplinary teamwork	Current	1	2	3	4	5
	Future	1	2	3	4	5
Self-evaluation	Current	1	2	3	4	5
	Future	1	2	3	4	5
Self management	Current	1	2	3	4	5
	Future	1	2	3	4	5
Leadership	Current	1	2	3	4	5
	Future	1	2	3	4	5
Research competence	Current	1	2	3	4	5
	Future	1	2	3	4	5
Communication	Current	1	2	3	4	5
	Future	1	2	3	4	5
Initiating change	Current	1	2	3	4	5
	Future	1	2	3	4	5
Negotiation/political advocacy	Current	1	2	3	4	5
	Future	1	2	3	4	5
Knowledge of discipline	Current	1	2	3	4	5
	Future	1	2	3	4	5
Adapting to situations of change	Current	1	2	3	4	5
	Future	1	2	3	4	5
Self-directed learning	Current	1	2	3	4	5
	Future	1	2	3	4	5
Risk-taking	Current	1	2	3	4	5
	Future	1	2	3	4	5
Managing people and tasks	Current	1	2	3	4	5
	Future	1	2	3	4	5
Seeing the “big picture”	Current	1	2	3	4	5
	Future	1	2	3	4	5

List any other attributes that you think are necessary in the performance of current and future duties

		Unimportant		Important		Very Important
	Current	1	2	3	4	5
	Future	1	2	3	4	5
	Current	1	2	3	4	5
	Future	1	2	3	4	5
	Current	1	2	3	4	5
	Future	1	2	3	4	5
	Current	1	2	3	4	5
	Future	1	2	3	4	5

2 In terms of future roles of MRS practitioners, which of the following statements best reflect your point of view *(Select only one. You may focus on your particular MRS discipline)*

The current roles of MRS practitioner are adequate, ie. there is no need for change	1
Other allied health professions are evolving, so should MRS	2
MRS practitioners are not maximizing their potential ie. they are capable of assuming greater responsibilities	3
Unsure	4
Other *(Please specify)*	5

3 There have been numerous discussions about role expansion for MRS practitioners. List any new role(s), which you think MRS practitioners should assume. *(You may focus on your particular MRS discipline)*

New roles	Do you agree that the newly added role(s) should form part of the core duties of MRS practitioners? Unsure	Strongly Disagree		Neutral		Strongly Agree
	0	1	2	3	4	5
	0	1	2	3	4	5
	0	1	2	3	4	5
	0	1	2	3	4	5

4 For the new roles listed in Q3, what attributes are needed to fulfill the corresponding responsibilities?

New roles listed in Q3	Attributes required

5 Please circle the number that best describes *your opinion of the level of professionalism* for each of the following:

	Level of professionalism: Unsure	Very low		Moderate		Very high
Chiropractors	0	1	2	3	4	5
Doctors	0	1	2	3	4	5
Nuclear medicine technologists	0	1	2	3	4	5
Nurses	0	1	2	3	4	5
Occupational therapists	0	1	2	3	4	5
Physiotherapists	0	1	2	3	4	5
Radiation therapists	0	1	2	3	4	5
Radiographers	0	1	2	3	4	5
Sonographers	0	1	2	3	4	5
Speech therapists	0	1	2	3	4	5

6 Please circle the number that best describes *your opinion of the general public's regard* for each of the following occupations as a profession:

	Level of general public's regard: Unsure	Very low		Moderate		Very high
Chiropractors	0	1	2	3	4	5
Doctors	0	1	2	3	4	5
Nuclear medicine technologists	0	1	2	3	4	5
Nurses	0	1	2	3	4	5
Occupational therapists	0	1	2	3	4	5
Physiotherapists	0	1	2	3	4	5
Radiation therapists	0	1	2	3	4	5
Radiographers	0	1	2	3	4	5
Sonographers	0	1	2	3	4	5
Speech therapists	0	1	2	3	4	5

7 ***In your opinion,*** **how *informed* is the general public about what:**

	Unsure	Very uninformed		Informed		Very well informed
chiropractors do?	0	1	2	3	4	5
doctors do?	0	1	2	3	4	5
nuclear medicine technologists do?	0	1	2	3	4	5
nurses do?	0	1	2	3	4	5
occupational therapists do?	0	1	2	3	4	5
physiotherapists do?	0	1	2	3	4	5
radiation therapists do?	0	1	2	3	4	5
radiographers do?	0	1	2	3	4	5
sonographers do?	0	1	2	3	4	5
speech therapists do?	0	1	2	3	4	5

8 **Changes in the workplace are inevitable. MRS practitioners may resist changes for a number of reasons. For the factors listed below, rate each item according to their level of importance.**

		Level of importance				
	Unsure	Unimportant		Important		Very Important
Fear of the unknown	0	1	2	3	4	5
Adapting to new changes are overwhelming	0	1	2	3	4	5
Remaining "status quo" gives comfort and security	0	1	2	3	4	5
Familiarity with existing technology makes life easier	0	1	2	3	4	5
Treading into the unknown may threaten job security	0	1	2	3	4	5
Considerable investment (time, money, effort) has been devoted to learning of current technology	0	1	2	3	4	5
Other *(Please specify)*	0	1	2	3	4	5

9 **Where do you see yourself in 5 years time?** *(Please select one)*

Status quo	1
In the same MRS discipline but with expanded skills	2
Undertaking further studies to assume duties in another MRS discipline	3
In a management position	4
In a different profession *(ie. not MRS related)*	5
Retired/semi-retired	6
Other *(Please specify)*	7

10 **Do you think the status of the MRS profession, in 5 years time, will be:**

Lower		Same		Higher
1	2	3	4	5

11 **Please feel free to add any further comments about the future of the profession.**

Section C: Continuing Professional Development (CPD)

*"Studies/courses" and "learning activities" refer to those activities that are related to your professional duties, MRS or other professions (and **not** leisurely pursuits).*

1 What is your highest academic qualification?

Certificate	1
Assoc Diploma	2
Diploma	3
Degree	4
Postgraduate Diploma	5
Master	6
PhD	7
Other *(Please specify)*	8

2 Do you wish to pursue further studies/courses in the foreseeable future?

Yes	1	*If no, proceed to Q5.*
No	2	

3 If yes, how soon do you think you would be starting your studies?

Within 1 year	1
Within 3 years	2
Within 5 years	3
Unsure when, but will do it sometime	4

4 Select *one* area that you feel you need further learning.

		Details *(Please indicate specific topic.)*
Advanced radiography	1	
Radiation therapy	2	
Nuclear Medicine	3	
Ultrasound	4	
Managerial skills	5	
Development of attributes: self management, leadership, research and negotiation/political advocacy etc	6	
Other *(Please specify)*	7	

5 Are you currently engaged in any of the following activities? *(You may choose more than one answer).*

In-house training (on the job training)	1	
Workshop, seminars and conferences	2	
Self-directed study (ie. regular reading of journals, books etc.)	3	
Accredited courses conducted by professional associations	4	
Postgraduate award courses conducted by universities	5	
Other *(Please specify)*	6	

6 For each of the factors listed below, rate each item according to the level of motivation that would cause *you* to engage in further learning.

	Level of motivation				
	Very low		**Moderate**		**Very high**
To gain specialist qualification	1	2	3	4	5
Salary increment	1	2	3	4	5
Promotion	1	2	3	4	5
To learn more about current job	1	2	3	4	5
Compulsory in the workplace to continue learning	1	2	3	4	5
Financial support from employer (eg. tuition fees, internet access, printing facilities at work etc)	1	2	3	4	5
Expectations from management that you engage in some form of learning	1	2	3	4	5
Other (*please specify*)	1	2	3	4	5

7 To what extent are the factors listed below *deterring you from* pursuing any formal course of study.

		Level of deterrence				
		Very low		**Moderate**		**Very high**
Time factor:	Shift work, unable to get relief from work; family commitment etc	1	2	3	4	5
Access factor:	Inability to access learning support	1	2	3	4	5
Financial factor:	Cost of study	1	2	3	4	5
Interest:	Not my priority	1	2	3	4	5
Other (*Please specify*)		1	2	3	4	5

8 How important to *you* is the following support, provided by employers, in encouraging you to engage in further learning?

	Level of importance				
	Unimportant		**Important**		**Very Important**
Time off from work	1	2	3	4	5
Financial support in terms of tuition fees	1	2	3	4	5
Financial support in the form of conference attendance	1	2	3	4	5
Use of office facilities such as computer, access to internet, printing and photocopying facilities	1	2	3	4	5
Other *(Please specify)*	1	2	3	4	5

9 Which of the following support for further learning is available in the workplace?
(You may select more than one option)

Time off from work	1
Financial support in terms of tuition fees	2
Financial support in the form of conference attendance	3
Use of office facilities eg. computer, access to internet, printing and photocopying facilities	4
Other *(Please specify)*	5

10 Rate each of the following learning modes in terms of *your* preference.

		Level of preference				
	Unsure	**Very low**		**Average**		**Very high**
On campus attendance: face-to-face learning	0	1	2	3	4	5
Problem-based learning	0	1	2	3	4	5
Collaborative learning *ie. learning with peers*	0	1	2	3	4	5
Distant learning *(course materials provided)*	0	1	2	3	4	5
Online learning *(learning activities and assignments are completed on the web)*	0	1	2	3	4	5
Other *(Please specify)*	0	1	2	3	4	5

The following questions seek to establish respondents' online learning experience

11 Do you use the computer daily? Yes 1 / No 2

What are your average hours of computer usage per week? _____ hours per week

12 For each of the following online activities, please rate *your* existing skill level.

	Level of skill					
	None	**Low**		**Average**		**Highly skilled**
Using a given URL *(ie. web address)* to locate a web site	0	1	2	3	4	5
Receiving and sending an email message with an attachment	0	1	2	3	4	5
Locating information using an internet search engine	0	1	2	3	4	5
Downloading a file	0	1	2	3	4	5
Completing a word document in a word processor	0	1	2	3	4	5
Managing electronic files and folders	0	1	2	3	4	5
Creating and maintaining a web site	0	1	2	3	4	5

13	**Up to now, how much experience have you had in using online activities for your own personal or professional development**	**None**	**A little**		**Some**		**A great deal**
		0	1	2	3	4	5

14	**How would you describe your experience of using online resources?** *(You may select more than one answer)*	Not applicable	1	
		Helped my learning	2	
		Accessible off campus	3	
		Interesting	4	
		Hard to access	5	
		Frustrating	6	
		Lonely	7	
		Other *(Please specify)*	8	

15	**Do you have access to:**			
	a computer that will enable you to participate in online learning	Yes	1	
		No	2	
	internet/web browser that will enable you to participate in online learning	Yes	1	
		No	2	

16	**Should the course be relevant to you, are you willing to enrol in online learning?**	Yes	1	
		No	2	

17 Any comments about online learning?

18	**You were aware of this survey via:**	Newsletter or journals	1	
		Professional websites	2	
		State branch meetings	3	
		Colleagues	4	
		Other *(Please specify)*	5	

Thank you for participating in this survey.

Please return this questionnaire
BEFORE 30th June 2003

If you have any questions concerning this survey, please feel free to contact the researcher:

Jenny Sim
Division of Medical Radiations
School of Medical Sciences
RMIT University
PO Box 71
mailto:j.sim@curtin.edu.au
Bundoora, Victoria
Australia 3083

Phone: +61 3 9925 7000
Fax: +61 3 9925 7466
Email: jenny.sim@ems.rmit.edu.au

Take 15 minutes to have your say on Continuing Professional Development in Medical Radiation Science

MRS Survey

About this survey

Complete the survey online

Download the survey

Request a hard copy of the survey

About the researcher

click here to bookmark this site

In order to obtain an accurate broad range of views, it is important that you as a MRS professional participate in the study. Your participation is highly valued and greatly appreciated.

Please complete the survey before 30th June 2003.
Thank you for your co-operation

Section A	Background information	Section :1 ID : 0
1. Gender	Female ☐	
	Male ☐	
2. Age group	20-29 ☐	
	30-39 ☐	
	40-49 ☐	
	50-59 ☐	
	60 and above ☐	
3. Are you currently?	Employed full time ☐	
	Employed part time/casual ☐	
	In full time study ☐	
	Retired ☐	
	Other ☐	please specify

Next >>

Section A	Background information			Section :2 ID : 212
4. You are currently working in	Australia	☐	State --select--	
	Overseas	☐	Country --select--	
5. Current status (ie. most hours)	MRS Practitioner	☐		
	Clinical tutor	☐		
	Head of MRS Department	☐		
	Academic	☐		
	Other	☐	Please specify	

Next >>

MRS Survey

Section A — Background information

Section :3
ID : 212

6. How many years have you been practising as a MRS pratitioner

- PDY/Intern year
- Less than 5 years
- 5-10 years
- 11-20 years
- More than 20 years

7. Your employer is

- Public
- Private

8. Indicate the work environment in which you are currently employed

- Metropolitan: Public hospital
- Metropolitan: Private hospital
- Metropolitan: Private clinic
- Regional / rural: Public hospital
- Regional / rural: Private hospital
- Regional / rural: Private clinic
- Other — please specify

9. Indicate the approximate number of employees in your MRS department

(includes nurses,receptionists,MRS practitioners,radiologists etc)

- 10 and less
- 11-20
- 21-50
- Above 50

10. Indicate the main area that you are currently working in

- Radiography
- Radiation therapy
- Nuclear medicine
- Ultrasound
- Management
- Other — please specify

Next >>

Section A	Background information		Section :3 ID : 212
11. This question seeks information about your initial/first MRS qualification	Certificate	☐	
	Associate diploma	☐	
	Diploma	☐	
	Degree	☐	
	Other	☐	please specify
You received the above qualification	Overseas	☐	--select--
	State within Australia	☐	-- select --
Institution where you obtained your qualification			please enter institution name
Year in which you obtained the above qualification	-- select --		

Next >>

MRS Survey

Section A	Background information		Section :4 ID : 212
12. If you received your initial qualification overseas, please indicate	The name of the professional group which you are/were a member of in your home country		
	From which Australian professional group did you have your qualification assessed?		

Next >>

MRS Survey

Section B — Meeting current and future challenges – attributes of MRS practitioners

Section : 4
ID : 212

1. Literature has shown practitioners in health professions need to prepare for future challenges. From the list of attributes below, rate each item in terms of importance for: (i) current practice (ii) future practice (in 5 years time)

Attributes		Level of importance				
		Unimportant		Important		Very important
Computer literacy	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Clinical competence	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Creativity and innovation	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Multi-diciplinary teamwork	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Self-evaluation	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Self management	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Leadership	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Research competence	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Communication	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Initiating change	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐
Negotiation/political advocacy	current	☐	☐	☐	☐	☐
	future	☐	☐	☐	☐	☐

Knowledge of discipline	current					
	future					
Adapting to situations of change	current					
	future					
Self-directed learning	current					
	future					
Risk-taking	current					
	future					
Managing people and tasks	current					
	future					
Seeing the "big picture"	current					
	future					

List any other attributes that you think are necessary in the performance of current and future duties (optional)

Attribute		Level of importance			
		Unimportant		Important	Very important
	current				
	future				
	current				
	future				
	current				
	future				
	current				
	future				

2. In terms of future roles of MRS practitioners, which of the following statements best reflect your point of view *You may focus on your particular MRS discipline*

The current roles of MRS practitioner are adequate, ie. there is no need for change	
Other allied health professions are evolving, so should MRS	

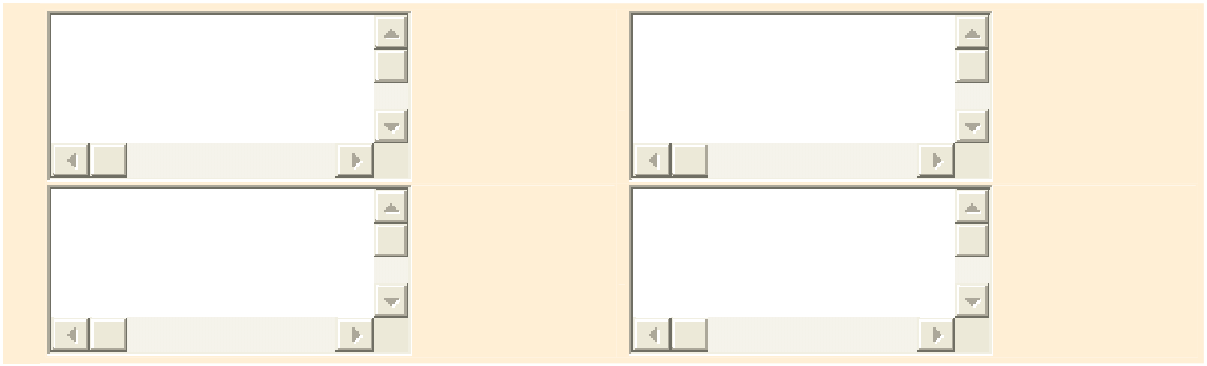
MRS practitioners are not maximizing their potential ie. they are capable of assuming greater responsibilities	☐
Unsure	☐
Other (please specify)	☐

3. There have been numerous discussions about role expansion for MRS practitioners. List any new role(s), which you think MRS practitioners should assume

	Do you agree that the newly added role(s) should form part of the core duties of MRS practitioners?					
	Unsure	Strongly disagree		Neutral		Strongly agree
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐

4. For the new roles listed in Q3, what attributes are needed to fulfill the corresponding responsibilities?

New roles listed in Q3	**Attributes required**



Next >>

MRS Survey

Section B — Meeting current and future challenges – attributes of MRS practitioners

Section :5
ID : 215

5. Please select the option that best describes *your opinion of the level of professionalism* for each of the following:

	Level of professionalism				
	Unsure	Very low		Moderate	Very high
Chiropractors	☐	☐	☐	☐	☐ ☐
Doctors	☐	☐	☐	☐	☐ ☐
Nuclear medicine technologists	☐	☐	☐	☐	☐ ☐
Nurses	☐	☐	☐	☐	☐ ☐
Occupational therapists	☐	☐	☐	☐	☐ ☐
Physiotherapists	☐	☐	☐	☐	☐ ☐
Radiation therapists	☐	☐	☐	☐	☐ ☐
Radiographers	☐	☐	☐	☐	☐ ☐
Sonographers	☐	☐	☐	☐	☐ ☐
Speech therapists	☐	☐	☐	☐	☐ ☐

6. Please select the option that best describes your opinion of the general public's regard for each of the following occupations as a profession:

	Level of general public's regard				
	Unsure	Very low		Moderate	Very high
Chiropractors	☐	☐	☐	☐	☐ ☐
Doctors	☐	☐	☐	☐	☐ ☐
Nuclear medicine technologists	☐	☐	☐	☐	☐ ☐
Nurses	☐	☐	☐	☐	☐ ☐
Occupational therapists	☐	☐	☐	☐	☐ ☐
Physiotherapists	☐	☐	☐	☐	☐ ☐
Radiation therapists	☐	☐	☐	☐	☐ ☐
Radiographers	☐	☐	☐	☐	☐ ☐

Sonographers	☐	☐	☐	☐	☐	☐
Speech therapists	☐	☐	☐	☐	☐	☐

7. In your opinion, how informed is the general public about what:

	Unsure	Very uninformed		Informed		Very well informed
chiropractors do?	☐	☐	☐	☐	☐	☐
doctors do?	☐	☐	☐	☐	☐	☐
nuclear medicine technologists do?	☐	☐	☐	☐	☐	☐
nurses do?	☐	☐	☐	☐	☐	☐
occupational therapists do?	☐	☐	☐	☐	☐	☐
physiotherapists do?	☐	☐	☐	☐	☐	☐
radiation therapists do?	☐	☐	☐	☐	☐	☐
radiographers do?	☐	☐	☐	☐	☐	☐
sonographers do?	☐	☐	☐	☐	☐	☐
speech therapists do?	☐	☐	☐	☐	☐	☐

8. Changes in the workplace are inevitable. MRS practitioners may resist changes for a number of reasons. For the factors listed below, rate each item according to their level of importance.

	Level of importance					
	Unsure	Unimportant		Important		Very important
Fear of the unknown	☐	☐	☐	☐	☐	☐
Adapting to new changes are overwhelming	☐	☐	☐	☐	☐	☐
Remaining "status quo" gives comfort and security	☐	☐	☐	☐	☐	☐
Familiarity with existing technology makes life easier	☐	☐	☐	☐	☐	☐
Treading into the unknown may threaten job security	☐	☐	☐	☐	☐	☐
Considerable investment (time, money, effort) has been devoted to learning of current technology	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐

(please specify) ☐

9. Where do you see yourself in 5 years time?

Status quo	☐
In the same MRS discipline but with expanded skills	☐
Undertaking further studies to assume duties in another MRS discipline	☐

In a management position	☐
In a different profession (ie. not MRS related)	☐
Retired/semi-retired	☐
Other (please specify)	☐

10. Do you think the status of the MRS profession, in 5 years time, will be:

Lower		Same		Higher
☐	☐	☐	☐	☐

11. Please feel free to add any further comments about the future of the profession.

Next >>

MRS Survey

Section C — Continuing professional development (CPD)

Section : 6
ID : 215

Studies/courses" and "learning activities" refer to those activities that are related to your professional duties, MRS or other professions (and not leisurely pursuits)

1. What is you highest academic qualification?

- Certificate
- Assoc Diploma
- Diploma
- Degree
- Postgraduate diploma
- Master
- PhD
- Other (please specify)

2. Do you wish to pursue further studies/courses in the foreseeable future?

- Yes
- No

Next >>

MRS Survey

Section C — Continuing professional development (CPD)

Section : 7
ID : 215

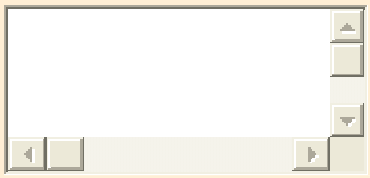
Studies/courses" and "learning activities" refer to those activities that are related to your professional duties, MRS or other professions (and not leisurely pursuits

3. How soon do you think you would be starting your studies?

- Within 1year ☐
- Within 3 years ☐
- Within 5 years ☐
- Unsure when ☐

4. Select one area that you feel you need further learning.

	Details (please indicate specific topic)
Advanced radiography ☐	
Radiation therapy ☐	
Nuclear medicine ☐	
Ultrasound ☐	
Managerial skills ☐	
Development of attributes: self management, leadership, research and negotiation/political advocacy etc ☐	

Other (please specify)	
	Next >>

MRS Survey

Section C — Continuing professional development (CPD)

Section : 8
ID : 215

Studies/courses" and "learning activities" refer to those activities that are related to your professional duties, MRS or other professions (and not leisurely pursuits

5. Are you currently engaged in any of the following activities?
(You may choose more than one answer).

- In-house training (on the job training) ☐
- Workshop, seminars and conferences ☐
- Self-directed study (ie. regular reading of journals, books etc.) ☐
- Accredited courses conducted by professional associations ☐
- Postgraduate award courses conducted by universities ☐
- Other (please specify) ☐ _____

6. For each of the factors listed below, rate each item according to the level of motivation that would cause you to engage in further learning

	Level of motivation				
	Very low		Moderate		Very high
To gain specialist qualification	☐	☐	☐	☐	☐
Salary increment	☐	☐	☐	☐	☐
Promotion	☐	☐	☐	☐	☐
To learn more about current job	☐	☐	☐	☐	☐
Compulsory in the workplace to continue learning	☐	☐	☐	☐	☐
Financial support from employer (eg. tuition fees, internet access, printing facilities at work etc)	☐	☐	☐	☐	☐
Expectations from management that you engage in some form of learning	☐	☐	☐	☐	☐
Other (please specify) _____	☐	☐	☐	☐	☐

7. To what extent are the factors listed below deterring you from pursuing any formal course of study.

		Level of deterrance				
		Very low		Moderate		Very high
Time factor:	Shift work, unable to get relief from work; family commitment etc	☐	☐	☐	☐	☐
Access factor:	Inability to access learning support	☐	☐	☐	☐	☐
Financial factor:	Cost of study	☐	☐	☐	☐	☐
Interest:	Not my priority	☐	☐	☐	☐	☐
Other (Please specify)		☐	☐	☐	☐	☐

8. How important to you is the following support, provided by employers, in encouraging you to engage in further learning?

	Level of importance				
	Unimportant		Important		Very important
Time off from work	☐	☐	☐	☐	☐
Financial support in term of tuition fees	☐	☐	☐	☐	☐
Financial support in the form of conference attendance	☐	☐	☐	☐	☐
Use of office facilities such as computer, access to internet, printing and photocopying facilities	☐	☐	☐	☐	☐
Other (please specify)	☐	☐	☐	☐	☐

9. Which of the following support for further learning is available in the workplace? (You may select more than one option)

Time off from work	☐
Financial support in terms of tuition fees	☐
Financial support in the form of conference attendance	☐
Use of office facilities eg. computer, access to internet, printing and photocopying facilities	☐
Other (please specify)	☐

10. Rate each of the following learning modes in terms of your preference

	Level of preference					
	Unsure	Very low		Average		Very high
On campus attendance: face-to-face learning	☐	☐	☐	☐	☐	☐
Problem-based learning	☐	☐	☐	☐	☐	☐
Collaborative learning ie. learning with peers	☐	☐	☐	☐	☐	☐
Distant learning (course materials provided)	☐	☐	☐	☐	☐	☐

Online learning (learning activities and assignments are completed on the web)						
Other (Please specify)						

11. The following questions seek to establish respondents' online learning experience

Do you use the computer daily? Yes / No

What are your average hours of computer usage per week? ____ hours per week

12. For each of the following online activities, please rate your existing skill level.

	Level of skill					
	None	Low		Average		Highly skilled
Using a given URL (ie. web address) to locate a web site						
Receiving and sending an email message with an attachment						
Locating information using an internet search engine						
Downloading a file						
Completing a word document in a word processor						
Managing electronic files and folders						
Creating and maintaining a web site						

13. Up to now, how much experience have you had in using on-line activities for your own personal or professional development

Level of experience

None	A little		Some		A great deal

14. How would you describe your experience of using online resources?

(you may select more than one answer)

- Not applicable
- Helped my learning
- Accessible off campus
- Interesting
- Hard to access
- Frustrating
- Lonely
- Other (please specify) ____

15. Do you have access to:	a computer that will enable you to participate in online learning	Yes ☐
		No ☐
	internet/web browser that will enable you to participate in online learning	Yes ☐
		No ☐
16. Should the course be relevant to you, are you willing to enrol in online learning?		Yes ☐
		No ☐
17. Any comments about online learning?		
18. You were aware of this survey via:	Newsletter or journals	☐
	Professional websites	☐
	State branch meetings	☐
	Colleagues	☐
	Other (Please specify)	☐

Submit >>

MRS Survey

Thankyou | Survey completed

Thank you for participating in this survey

Letters to Heads of Clinical Departments seeking support for CPD Survey

Appendix 3.3

10th May 2003

Sir/Madam
Chief Radiographer

Dear Sir/Madam

Re: National Survey on Continuing Professional Development in Medical Radiation Science

I am a full-time PhD candidate from Division of Medical Radiations, RMIT University. I am currently conducting a research, investigating continuing professional development (CPD) in Medical Radiation Science (MRS) in Australia. The purpose of this letter is to seek your assistance and support in my research project.

The main data collection activity involves a national survey of MRS practitioners. Specifically, the aim of this survey is to establish the future needs of the MRS profession and the attributes that MRS practitioners need to meet these needs *(MRS practitioners here include radiographers, radiation therapists, nuclear medicine technologists and sonographers. Hence they are all eligible to participate in the survey)*. For this to be a success, the survey has to be distributed to as wide a professional community as possible. To this end, I would appreciate if you could assist by distributing and promoting the survey not only within your department but also amongst Canberra Imaging Group branches.

The survey will require approximately 15 minutes to complete. Practitioners can complete the survey on the web or on paper. The survey is available on the following url: **http://cpdsurveymrs.com** or via the AIR website: **http://www.ausinrad.com/main.html** Alternatively, the survey can also be downloaded from the website. I have enclosed A4 flyers announcing the survey url. Please also find enclosed an original copy of the survey for you to photocopy. If you need additional copies, please feel free to duplicate as many as required or let me know and I will forward additional copies of survey to you. In order to facilitate the returns of the surveys (as there is no self-addressed envelope due to budget constraint), may I be so bold as to suggest that the Department collect the completed surveys and mail them to me? ☺

The significance of this study lies not only in its contribution to the knowledge domain, but also in its practical outcomes for MRS practitioners and the profession. Data obtained from this survey will assist in the development of an online program, which will assist practitioners to develop those attributes that have been identified as essential in the performance of current and future duties and services to our patients. As soon as all responses have been analysed, the results will be released via conferences, paper publication and through the web.

Please do not hesitate to contact me should you have any queries, or are interested to find out more about the research project.

Thank you once again for your help in this research project.

With much appreciation

Jenny Sim
PhD candidate
RMIT University
Division of Medical Radiations

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Fax: (03) 9925-7466

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The Australian Institute of Radiography

The national professional organization representing Radiographers, Radiation Therapists and Sonographers

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A call to ALL MRS practitioners

Have your say on this hotly debated issue…….
By completing the Survey on
Continuing Professional Development
in
Medical Radiation Science

Click on this **http://cpdsurveymrs.com** and enter

For any profession to remain relevant in these rapidly changing times, it is essential that graduates and practitioners be adequately prepared for the future (Candy, 2000). The aim of this survey is to establish the future needs of the Medical Radiation Science (MRS) profession and the attributes that MRS practitioners need to meet these needs. One of the tangible outcomes will be the development of an online program, which will assist practitioners to develop those attributes that have been identified as essential in meeting the future challenges of the MRS profession.

Candy, P. C. (2000). Learning and earning: graduate skills for an uncertain future. Paper presented at the Inaugural International Lifelong Learning Conference, Yeppoon, Queensland, July 17-19.Inaugural

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Please read the privacy statement and the note of caution
This page last updated on Monday, 28 April 2003

The Australian Institute of Radiography site can be found here

Publicity of CPD Survey 2003 on the Centre for Magnetic Resonance website

Appendix 3.5

Future of your profession – where are we heading?

A call to ALL MRS practitioners –
(radiographers, radiation therapists, sonographers and nuclear medicine technologists)

Have your say on this hotly debated issue…….

By completing the Survey on
Continuing Professional Development
in
Medical Radiation Science

Click on this http://cpdsurveymrs.com and enter

Any enquiries can be directed to:
Administrative Assistant
Magnetic Resonance Technology
Centre For Magnetic Resonance
The University of Queensland
Brisbane Queensland 4072
Australia
Telephone: +61 7 3365 8263
Facsimile: +61 7 3365 3833
Email: mrt@cmr.uq.edu.au

or **On-line request form**

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Publicity of CPD Survey 2003 via the Australian Institute of Radiography's electronic discussion list

Appendix 3.6

From: Jenny Sim
To: owner-airnews@lists.connect.com.au
Date: Wednesday - May 14, 2003 11:59 PM
Subject: Have your say: CPD in Medical Radiation Science

Dear All
I would like to draw your attention to the continuing professional development (CPD) survey that is currently available on the following url: **http://cpdsurveymrs.com** The aim of this survey is to establish the future needs of the Medical Radiation Science (MRS) profession and the attributes that MRS practitioners need to meet these needs [MRS practitioners here include radiographers, radiation therapists, nuclear medicine technologists and sonographers. Hence they are all eligible to participate in this survey].

Outcomes
The information you provide will assist in shaping continuing professional development CPD of the MRS profession by:
· identifying the attributes (ie. characteristics) that ***you*** think are important in the performance of your current and future duties as a MRS practitioner
· informing the MRS community of ***your*** views on CPD and the future of the profession

The significance of this study lies not only in its contribution to the knowledge domain, but also in its practical outcomes for MRS practitioners and the profession. Data obtained from this survey will assist in the development of an online program, which will assist MRS practitioners to develop those attributes that have been identified as essential in the performance of current and future duties and in improving services to our patients.

Availability
The survey will require approximately 15 minutes of your time. You can complete the survey on the web or on paper. The survey is available on the following url: **http://cpdsurveymrs.com** You can also access the survey via the AIR website: **http://www.ausinrad.com/main.html** If you prefer to complete the survey on paper, it can be downloaded from the website. Alternatively, hard copies of the survey can also be obtained directly from the researcher or Chairperson of AIR State branches.

Confidentiality and findings
Your responses will be treated in the strictest confidence. All data obtained will be reported only in an aggregated form, so that it will not be possible to identify individual responses. Information provided will not be made available to any individual or organisation. Data collected will be stored for a 5-year period, with the researcher responsible for the storage and security of the data, after which all data will be destroyed. (Hard copy will be shredded and electronic data, including all back up, will be deleted.) Results from this survey will be reported via conferences and paper publication as soon as all responses have been analysed.

In order to obtain an accurate broad range of views, may I urge you and your colleagues to send in your response. Your participation is highly valued and greatly appreciated.

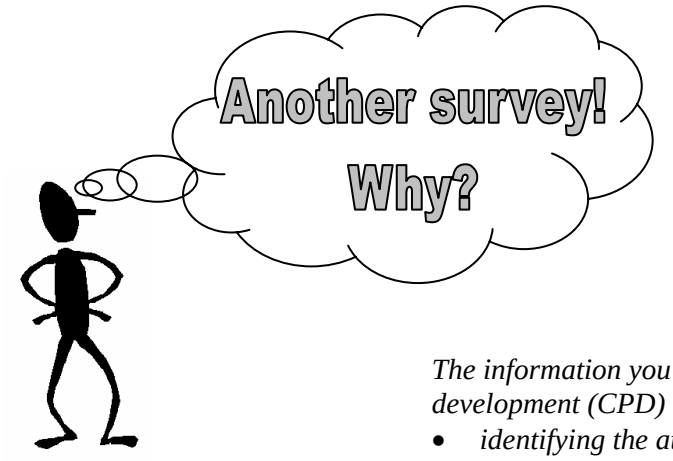
It would be greatly appreciated if you could return the completed survey before 30th June 2003.

Thank you for your cooperation.
Yours Sincerely
Jenny

Jenny Sim
PhD candidate
RMIT University
School of Medical Sciences
Division of Medical Radiations
PO Box 71, Bundoora, Vic 3083, Australia
Tel: (03) 9925 7000
Fax: (03) 9925-7466

Use 15 minutes to have your say on

Continuing Professional Development
in
Medical Radiation Science



The aim of this survey is to establish the future needs of the MRS profession and the attributes that MRS *practitioners need to meet these needs.

The information you provide will assist in shaping continuing professional development (CPD) of the MRS profession by:

- *identifying the attributes that **you** think are important in the performance of your current and future duties as a MRS practitioner*
- *informing the MRS community of **your** views on CPD and the future of the profession.*

Outcome

Data obtained from this survey will assist in the development of an educational framework for CPD, an online program, which will assist practitioners to develop those attributes that have been identified as essential in meeting the future challenges of the MRS profession.

By completing a Survey on

Continuing Professional Development
in
Medical Radiation Science

You can access the survey directly from **http://cpdsurveymrs.com** or via the following websites: AIR, Centre for Magnetic Resonance and The Adelaide MRI Website, Alternatively, hard copies of the survey can be obtained directly from the researcher or the Chairperson of State branches.

It would be greatly appreciated if you could return the completed survey before 30th June 2003.
Thank you for your cooperation

Jenny Sim
Division of Medical Radiations,
School of Medical Sciences
RMIT University
PO Box 71, Bundoora, Victoria
Australia 3083
Tel: +61 3 9925 7000
Fax: +61 3 9925 7466
Email: **jenny.sim@ems.rmit.edu.au**

**MRS Practitioners include radiographers, radiation therapists, nuclear medicine technologists and sonographers.*

Each questionnaire will be treated in the strictest confidence. Information provided will not be made available to any individual or organisation. All data obtained will be reported only in an aggregated form, so that it will not be possible to identify individual responses. Results from this survey will be released via conferences, paper publication, electronic discussion list and through the internet as soon as all responses have been analysed.

MRS attributes

1 Current attributes
What *key attributes* do MRS practitioners need for their *current duties*?
[*Some examples of attributes include critical thinking, teamwork and problem solving*]

2 New roles
Do you think MRS practitioners should assume *new roles*/greater responsibilities?
If yes, please *specify* these *new roles*.

3 Key attributes
What are the *key attributes* that will assist MRS practitioners in the performance of their *new roles* as specified in Q2?

Future of the MRS profession

4 MRS status: 5 years
Do you think the *status* of the *MRS profession*, in *5 years time*, will be:

Lower		Same		Higher
1	2	3	4	5

5 Active role: why & how
Should MRS practitioners assume a more active role in the health profession? Why & How?

6 Future of profession
Please comment on the future of the Medical Radiation Science profession.

CPD in MRS

7 CPD definition
What does Continuing Professional Development (CPD) mean to you?

8 Practitioners areas of further learning
What areas do you wish to see your staff pursue in their further learning?

9 HOD areas of further learning
In terms of your own professional development, do you have any particular areas that you wish to pursue?

10 CPD support
Is there any form of support in the workplace, which assists practitioners in their CPD?

11 Success of CPD support
If yes, are these measures effective? If no, are there any plans to implement any form of support?

MRS Research

12 Practitioners involvement in research
Should MRS practitioners be involved in research?

13 Adv & Disadv of research
What may be some advantages and disadvantages of undertaking research for the:
(i) practitioner
(ii) workplace
(iii) profession?

14 Examples of research
Please provide some examples of research projects that you think would benefit the workplace.

15 Research support
In what ways can the workplace support practitioners in research projects?

Thank you for participating in the interview

Chi-Square tests conducted on the importance of attributes for current practice between MRS practitioners and HODs

Appendix 4.1

	Attributes	Importance of attributes for current practice between MRS practitioners and HODs	
		Significant Pearson Chi-Square values	**p-values <0.05**
G	Computer literacy		.770
P	Clinical competence		.668
R	Creativity and innovation		.641
G	Multi-disciplinary teamwork		.623
LLL	Self-evaluation		.077
LLL	Self management		.060
L	Leadership		.214
P	Research competence		.068
G	Communication		.228
PL	Initiating change		.256
PL	Negotiation/political advocacy	**6.132**	**.047**
P	Knowledge of discipline	**6.551**	**.038**
LLL	Adapting to situations of change		.142
LLL	Self-directed learning		.526
PL	Risk-taking		.254
G	Managing people and tasks	**8.229**	**.016**
LLL	Seeing the “big picture”		.228

Note: Chi-square test with probability set at the 0.05 level
Bold number indicates the attribute has been identified as statistically significant, by MRS practitioners and HODs.

Chi-Square tests conducted on the importance of attributes for future practice between MRS practitioners and HODs

Appendix 4.2

	Attributes	Importance of attributes for future practice between MRS practitioners and HODs	
		Significant Pearson Chi-Square values	**p-values <0.05**
G	Computer literacy		.828
P	Clinical competence		.475
R	Creativity and innovation		.758
G	Multi-disciplinary teamwork		.989
LLL	Self-evaluation		.144
LLL	Self management	**7.527**	**.023**
L	Leadership		.126
P	Research competence		.090
G	Communication		.493
PL	Initiating change		.309
PL	Negotiation/political advocacy	**9.796**	**.007**
P	Knowledge of discipline		.082
LLL	Adapting to situations of change		.063
LLL	Self-directed learning	**7.010**	**.030**
PL	Risk-taking		.230
G	Managing people and tasks		.264
LLL	Seeing the “big picture”	**7.842**	**.020**

Note: Chi-square test with probability set at the 0.05 level
Bold number indicates the attribute has been identified as statistically significant, by MRS practitioners and HODs.

Chi-Square tests conducted on professionalism, public regard and public knowledge of health professions

Appendix 4.3

Professions		Pearson Chi-Square between MRS practitioners and HODs		
		Level of professionalism	Level of general public's regard	Level of public knowledge of the profession
		(n=408)	(n=411)	(n=411)
Reference	Doctors	.352	.662	.669
	Nurses	.867	**.039**	.462
Allied health	Physiotherapists	.216	.504	.530
	Occupational therapists	.224	.958	.597
	Speech therapists	.556	.542	.963
	Chiropractors	.945	.440	.062
MRS disciplines	Sonographers	.177	.576	.542
	Radiation therapists	.132	.566	.130
	Radiographers	**.021**	.884	.349
	Nuclear medicine technologists	.318	.663	.476

Note: Chi-square test with probability set at the 0.05 level
Bold number indicates the attribute has been identified as statistically significant, by MRS practitioners and HODs.

Category	Description of category	No.	%
Lack of engagement	• Lacks face to face interaction: impersonal • Lacks peer support • Lacks guidance for further learning: non availability of lecturers to assume the role • Lacks feedback • Lacks supervision • Lacks motivation and direction • Lacks empathy, deals only with hard facts • Prefers face to face • Reluctant to ask questions on web forums • Not challenging	31	20.0
Negative online learning experience	• Frustrating • Time consuming • Eye fatigue: too much text; difficult to digest and read from screen • Costly due to printing cost • Waste of time • Difficult to use • Not helpful • No “hands-on” • Not interested	31	20.0
Expectations of online learning	• Must first provide education and support for students new to online learning • Must be able to talk directly to lecturers • Must have adequate support and resources etc • Must be relevant to student’s needs (can’t see how online learning can assist students in their workplace practices) • Must be easy to use • Must be highly accessible • Must be presented in an appropriate format • Must provide clarity • Must be financially realistic: minimal cost • Must have sufficient time to prepare for online chat • Must to be supported by other methods of learning eg. face to face lectures and course notes needed	30	19.3
Positive online learning experience	• Diverse views via online learning • Fabulous resources • Easy access to information • Convenient and accessible at all times • Learning at one’s own pace • Interesting • Fun to learn • Useful and helpful method of learning • Easy to use	28	18.1
Access issue	• Not everyone has a computer at home • Need to access computer at work too • Heavy workload prevents access at work • Outdated personal computers limits online learning	11	7.0
Attributes of online learning	• Requires self discipline • Needs good time management • Takes responsibility for your own learning • Extract relevant knowledge from online resources • Needs to be motivated & be able to self evaluate	8	5.2
Technical issue	• Server busy or slow internet download • Minimal downtime a must • Bad connections	6	3.9
Others	• Issues not related to online learning	10	6.4
	Total	**155**	**100.0**

Certificate of Participation

Professional Development in Radiation Therapy

This is to certify that

**

has participated and completed the online module

Reflection on Professional Practice

26 March to 25 June 2004

The module required the participant to engage in the following activities:

Sharing and exchanging information with their online peers
Retrieving journal articles from electronic database
Critiquing and analysing radiation therapy literature
Reflecting at an individual and collective level about their learning and workplace practices
Participating (via assignment) in a mini-trial run of Evidence Based Practice

…… ……
RT Facilitator 1 RT Facilitator 2

…… ……
RT Facilitator 3 Jenny Sim (Moderator)

Dated: 22nd July 2004

This module forms part of a doctoral study and is not part of RMIT curriculum

Letter to Heads of Radiation Therapy Centers seeking support for 1st pilot module — Appendix 5.3

18th February 2004

Sir/Madam

Dear Sir/Madam

Online module for Radiation Therapists:
Calling for volunteers

I am a full-time PhD candidate from the Division of Medical Radiations, RMIT University. I would like to inform you of the availability of a new online module, specifically designed to assist radiation therapists in their professional development and in enhancing their professional practice. The aim of this letter is therefore to seek your support in encouraging your staff to participate in this module.

About the module

You may recall the National Survey on *Continuing Professional Development in Medical Radiation Science* that was conducted in May and June 2003. Data obtained from the survey was used to inform me in putting together an online module. The module aims to:

- meet the learning needs identified by the practitioners;
- assist in their professional development; and
- enhance their professional practice.

These objectives are achieved by structuring the learning activities to assist the participants to reflect upon their existing and newly acquired knowledge and by engaging them in reflective dialogues with their peers. Participants will learn how to successfully integrate their existing and new knowledge, workplace experiences and shared reflections into their work practices.

The online module will last for 13 weeks, starting on the 29th March and finishing on the 25th June 2004. In order to maximize the benefits from this module, participants are encouraged to set aside 3-hours per week. Participation is on a voluntary basis. As this module forms part of my PhD study, there are no course fees involved. For the first pilot, enrolment is restricted to 12 participants and is available to all treatment centres in Victoria.

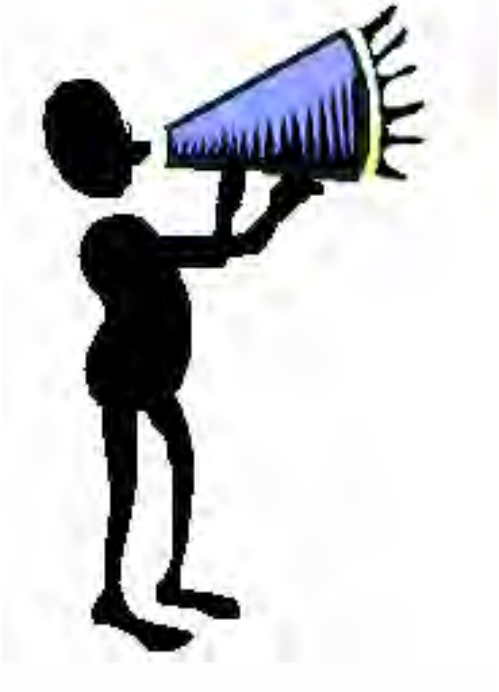
Seeking your support

I would be most grateful if you could circulate the attached green flyer within your department, drawing your staff's attention to the availability of the online module, and encouraging them to enroll and participate. The yellow flyer contains detailed information for staff who are interested to know more about the module. As this is an educational issue, I will be contacting your Education Officer shortly for further publicity and follow-up.

Please do not hesitate to contact me should you have any queries, or are interested to find out more about this online module.

Thank you once again for your assistance in this research project
With much appreciation

Jenny Sim
Division of Medical Radiations
18th February 2004



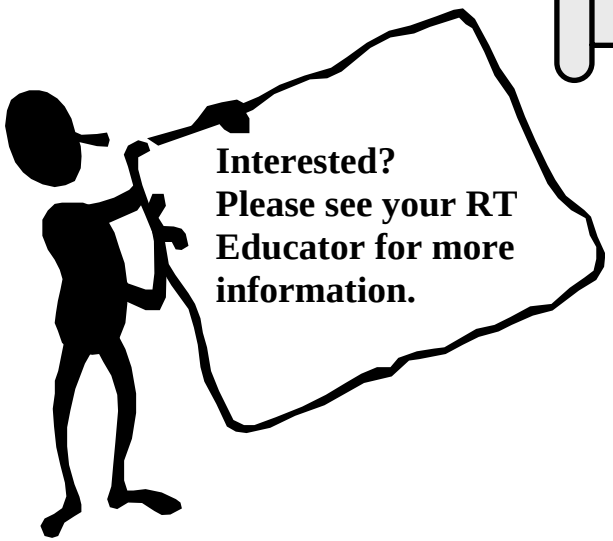
Calling for RT volunteers.....

Discover the exhilaration of learning

within a professional online community!

Benefits of participation:

- **Consolidate and extend your knowledge of Breast Planning in RT**
- **Enhance your use of evidence based practice**
- **Extend your professional networks**
- **Accrue 20 credits towards your CPD activities**



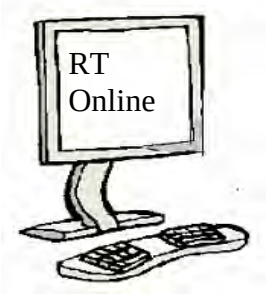
Discover the exhilaration of learning within a professional online community!

Professional Development in Radiation Therapy

How will I benefit from this module?

1. **By consolidating and extending your knowledge of Breast Planning in Radiation Therapy. Topics include: *The role of Radiation Therapy*, *Current planning practices*, and *Tattoos & Skin marks.***
2. **By value-adding to your knowledge base through exploration and reflection.**
3. **By using innovative, creative approaches to enhance your use of evidence based practice.**
4. **By extending your professional networks through simple communication using current technologies.**
5. **By accruing 20 credits towards your CPD activities.**

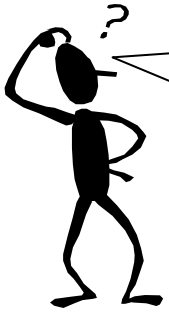
About this module



Duration	13 weeks: 29th March 2004 to 25th June 2004
Time commitment	Approximately 3 hours per week
Cost	Free Upon successful completion of the module, participants will gain 20 credits towards their CPD activities & a Certificate of participation.
Learning activities	Communication with your peers and lecturers online, encompassing one major assignment, and collation of the relevant discussions into a learning portfolio.
RT facilitators	Facilitator 1 [Academic Staff] Facilitator 2 [Senior Radiation Therapist, Radiation Therapy Centre] Facilitator 3 [Clinical Educator, Radiation Therapy Centre]

I am wary of online learning because…..

- *I am computer illiterate*
  This online module is suitable for both the computer novice and the expert We will guide you step by step through the process.
- *I have no spare time*
  One of the advantages of online learning is its flexibility. Hence, you are not "tied" to the computer at a specified time as in face-to-face learning. All you need is to commit a total of 3-hours per week at times convenient to you.
- *I don't believe in online learning…and radiation therapy online?!*
  Since much of our learning depends on our ability to articulate and share our professional knowledge, exploring issues with peers online can assist in clarifying our thoughts and enhancing our professional understanding. The current literature demonstrates that, when the online learning is structured appropriately, students can gain enormous encouragement and support from their peers and lecturers, providing a strong sense of belonging to the learning community. With renewed interest and new perspectives, you may be surprised at the learning that occurs!



What will I need to be able to participate in this module?

- access to a computer and the internet;
- curiosity, motivation and a willingness to share your work experience, knowledge and thoughts online;
- approximately 3-hours per week; and
- a desire to complete the full 13 weeks of the module.

How do I let you know?

For more information or to express your interest, please contact your RT educator or Jenny Sim (see contact details below)

Email: jenny.sim@ems.rmit.edu.au
Tel: (03) 9925 7000
Fax: (03) 9925-7466

RMIT University
Division of Medical Radiations
PO Box 71
Bundoora, Victoria 3088

Explanatory statement to participants about research study **Appendix 5.5**

Project Title **Continuing professional development in Medical Radiation Science: journey towards reflective practice in cyberspace**

10th March 2004

Dear Participant

I am a PhD candidate undertaking research in the area of continuing professional development (CPD) in Medical Radiation Science. The aim of my project is to design and develop a postgraduate online learning experience to assist radiation therapists in their professional development. Specifically, the online module aims to enhance practitioners' workplace practices via the process of reflection.

The online module will last for 13 weeks, starting on the 29th March and finishing on the 25th June 2004. As this module forms part of my PhD study, participation in this module is free. In terms of ensuring successful learning outcomes for the participants, intrinsic motivation of the learner is crucial. As such, a desire and willingness to see through the 13 weeks module is desirable.

Learning in this module occurs within an online learning community. All activities are structured so as to provide participants with multiple perspectives, promote critical thinking and reflection. Participants will learn how to successfully integrate their new knowledge, experiences and shared reflections into their work practices. The topic for this module is on breast planning in radiation therapy, focusing on the role of radiation therapy, current planning practices and tattoos & skin marks. The final four weeks will be devoted to applying evidence based practice in your workplace.

In order to achieve the expected learning, participants will need to:

- participate in online discussions (posting your thoughts and responding to your peers);
- complete an evidence based practice assignment;
- compile a learning portfolio (consisting mainly of your 13 weeks of contributions to online discussions);
- Provide feedback on the module through surveys and interviews as appropriate.

It is estimated that the activities will take approximately three hours per week.

Upon successful completion of the module, participants will be awarded a Certificate of Participation and be able to claim 20 credits towards their CPD activities. Please note that participation is voluntary. Should you wish to withdraw from the study, you may do so any time.

Data obtained during the module will be treated in the strictest confidence. All data obtained will be reported only in an aggregated form, so that it will not be possible to identify individual responses. A coding system will be assigned to participants, so that if direct quotes are used, it will not be possible to identify the participant concerned. All data collected will be stored for a 5-year period, with the researcher responsible for the storage and security of the data.

If you wish to participate in this study, please circle the 'yes' and sign the attached consent form. Due to ethics requirements, you are not able to take part in this study until we have received your consent form. Hence, please ensure that the signed consent is returned to us in the self-addressed envelope by 19th March 2004.

Your time, participation and input in this study are greatly appreciated.
Thank you

Yours sincerely

Jenny Sim

Project Title:	**Continuing professional development in Medical Radiation Science: journey towards reflective practice in cyberspace**
Primary Supervisor:	Professor Alex Radloff Dean Academic Development, Science, Engineering & Technology Portfolio Email: alex.radloff@rmit.edu.au Phone: (03) 9925 7185
Researcher Contact	Email: jenny.sim@ems.rmit.edu.au Phone: (03) 9925 7000 Fax: (03) 9467 8589

Informed consent form for persons participating in PhD study

Project Title **Continuing professional development in Medical Radiation Science: journey towards reflective practice in cyberspace**

SET PORTFOLIO	Science, Engineering & Technology Portfolio		
SCHOOL	School of Medical Sciences, Division of Medical Radiations		
Name of Researcher	Jenny Hiow-Hui SIM	Phone:	(03) 9925 7000
		Fax:	(03) 9467 8589
		Email:	jenny.sim@ems.rmit.edu.au
Primary Supervisor	Professor Alex RADLOFF Dean Academic Development Science, Engineering & Technology Portfolio	Phone Email:	(03) 9925 7185 alex.radloff@rmit.edu.au

Instructions
To show your consent to each of the tasks below, please circle the 'yes' and sign the form (witness's signature required). The attached Explanatory Statement is for you to keep.

I have read the attached Explanatory Statement explaining about this project.	Yes
I understand that by participating in this module I am agreeing to:	
• participate in online discussions	Yes
• complete and submit the evidence based practice assignment	Yes
• compile a learning portfolio (This consists mainly of your weekly reflections throughout the 13-week module, plus your reflections of critical incidents and some additional questions)	Yes
• provide feedback about the online module through surveys and participate in interviews as appropriate	Yes
• have comments that I post to the electronic discussion forum to be included anonymously in the thesis	Yes

The confidentiality of the information I provide will be safeguarded. No information that can identify any person will be included in project report, or given to any person not in the research team.

I understand that findings from this module will be presented in the researcher's thesis, as well as in journal articles, conference presentations and educational forums.

I also understand that my participation is voluntary and I am free to withdraw from the study any time.

Participant's Consent

Name of Participant

Name _____ Date _____
(participant)

Name _____ Date _____
(witness to signature)

Please keep a photocopy of this consent form after it has been signed (The Explanatory Statement is your copy)

Any complaints about your participation in this project may be directed to the Secretary, RMIT Human Research Ethics Committee, University Secretariat, RMIT, GPO Box 2476V, Melbourne, 3001. The telephone number is (03) 9925 1745.

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Post-Module Survey

Information obtained here will help us to determine the extent to which this online module assisted you, as well as to identify the strength and areas of improvement. Information provided here is strictly confidential. Responses will only be reported in aggregated form.

Section A: About this module (Please **bold** the appropriate number)

1 For each of the following statements, please indicate your response

		Unsure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(a)	The RT topics were relevant to my professional responsibilities	0	1	2	3	4	5
(b)	My understanding of the topics was enhanced	0	1	2	3	4	5
(c)	The online discussions provided opportunities for my reflection	0	1	2	3	4	5
(d)	I enjoyed participating in this module	0	1	2	3	4	5
(e)	I would enrol in a similar format of online forum discussion module	0	1	2	3	4	5
(f)	Exchanges at the Discussion Forum stimulated more exploration of issues than would be possible with individual learning	0	1	2	3	4	5
(g)	My time spent in this online module was worthwhile	0	1	2	3	4	5
(h)	My motivation to learn increased as the module progressed	0	1	2	3	4	5
(i)	The online module required me to assume more responsibility for my own learning.	0	1	2	3	4	5
(j)	The EBP activities were relevant to my professional responsibilities	0	1	2	3	4	5
(k)	I would recommend this module to my colleagues	0	1	2	3	4	5

Additional comments

Section B: About your learning (Please **bold** the appropriate number)

2 For each of the following statements, please indicate your response.

		Unsure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(a)	I am more confident about online learning	0	1	2	3	4	5
(b)	I have learned about accessing & retrieving relevant articles via electronic database	0	1	2	3	4	5
(c)	My ability to review, analyse and critically evaluate literature has been enhanced	0	1	2	3	4	5
(d)	I have a better understanding of EBP in RT	0	1	2	3	4	5
(e)	I am more confident in *initiating* professional discussions in my workplace	0	1	2	3	4	5
(f)	I am more confident in *participating* in professional discussions in my workplace	0	1	2	3	4	5
(g)	The multiple perspectives that were presented at the Discussion Forum were useful in shaping my understanding	0	1	2	3	4	5
(h)	I successfully integrated the new knowledge obtained via the online discussions into my existing knowledge and experience	0	1	2	3	4	5

		Unsure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(i)	Sharing and exchanging ideas with my online peers encouraged me to log on and participate in the discussions	0	1	2	3	4	5
(k)	We felt more cohesive as a group by the end of the module than when we first started	0	1	2	3	4	5
(l)	We learned to support one another in our learning	0	1	2	3	4	5
(m)	I felt part of the group	0	1	2	3	4	5
(n)	I was encouraged by my peers' acknowledgement of my contributions at the Discussion Forum	0	1	2	3	4	5
(o)	My learning increased as a result of the group interactions	0	1	2	3	4	5
(p)	I enjoyed the collaborative form of learning at the Discussion Forum	0	1	2	3	4	5
(r)	I felt valued as a member of the team	0	1	2	3	4	5

What have you learned about yourself as a learner?

What effect did the discussions have on your views on professional issues?

Additional comments

3	**As a result of this 15-week module:**	Unsure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(a)	I enhanced my time management skills	0	1	2	3	4	5
(b)	I feel more confident to provide feedback to my peers	0	1	2	3	4	5
(c)	my contribution, in terms of workplace discussions, increased	0	1	2	3	4	5
(d)	my ability to articulate my views increased	0	1	2	3	4	5
(e)	my confidence as a learner increased	0	1	2	3	4	5
(f)	I am better able to monitor my own learning	0	1	2	3	4	5
(g)	my confidence to engage in reflective practice in the workplace increased	0	1	2	3	4	
(h)	I am more confident in setting my own learning agenda	0	1	2	3	4	5
(i)	I am motivated to learn	0	1	2	3	4	5
(i)	the discussions increased my appreciation of the complexities of the RT workplace	0	1	2	3	4	5
(j)	I feel more confident to meet new challenges in the workplace	0	1	2	3	4	5
(k)	my ability to meet new challenges in the workplace has increased	0	1	2	3	4	5

For each of the following statements, please indicate your response.

4	Upon completion of the module:	Unsure	Very Low		Ave		Very high
(a)	my ability to share knowledge with my peers is:	0	1	2	3	4	5
(b)	my ability to consider alternative viewpoints	0	1	2	3	4	5
(c)	my ability to identify inconsistencies and contradictions in an argument	0	1	2	3	4	5
(d)	my ability to change my view in light of "new" evidence	0	1	2	3	4	5
(e)	my ability to apply knowledge more effectively in the workplace by engaging in reflective practice	0	1	2	3	4	5
(f)	my ability to reflect on my professional reading	0	1	2	3	4	5
(g)	my ability to integrate new knowledge, and experiences into my practice	0	1	2	3	4	5

What was the best thing about the module?

What was the worst thing about the module?

How can this module be improved?

Thank you for completing this survey

Please send this as an email attachment to the E-moderator, Jenny Sim, by 13th December 2004

Mid-Module Feedback

The aim of this survey is to gather feedback about your experiences so far. Information provided is confidential and responses will only be reported in aggregated form.

Section A: About this module (Please **bold** the appropriate number)

1		**Unsure**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
(a)	The instructions for the activities are clear	0	1	2	3	4	5
(b)	You are able to access RMIT Blackboard without difficulty	0	1	2	3	4	5
(c)	The feedback provided by your peers is helpful	0	1	2	3	4	5
(d)	The feedback provided by the facilitators is helpful	0	1	2	3	4	5
(e)	The prompts provided by the facilitators are helpful	0	1	2	3	4	5
(f)	The learning resources examples provided are useful	0	1	2	3	4	5
(g)	There is sufficient time allocated for each learning activity	0	1	2	3	4	5

2. Please indicate the average number of hours you spent on the module per week. _____ hours/week

3. From the RT discussions thus far (Please bold your choices):

- Have you picked up any practices from your peers that you find useful? Yes No
- Are there any current departmental practices that you would like to change? Yes No
- If yes, please elaborate.

- Will you try and implement these changes? Yes No
- If yes, how do you intend to make these changes?

4. **What are the other learning outcomes you have achieved from participating in these activities so far? Do you think these outcomes are worth the time you have invested?**

5. As part of CPD, this online module is designed with the intention of participants participating in these online activities at your own spare time. That inevitably will impact upon the little 'spare time' that you have left. **Does this additional load impact on your ability to engage with your online peers at a deeper level? Are you satisfied with the level of exchanges that are taking place at the Discussion Forum? Any suggestions most welcome!**

6. **What do you like best about this module thus far?**

7. **What areas of the module can be further improved?**

8. **Additional comments**

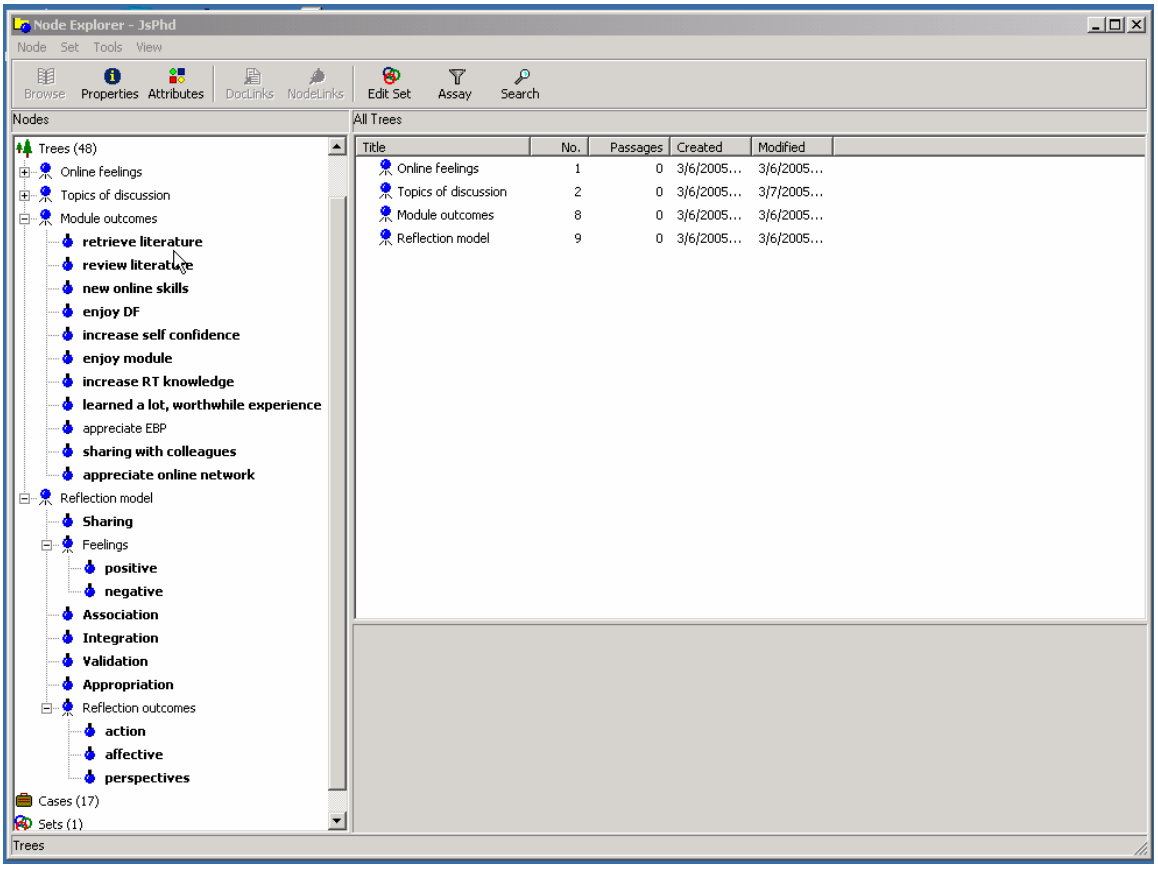
Thank you for completing this survey

Please send this as an email attachment to the E-moderator, Jenny Sim, by 7th October 2004

1st pilot % & (no.) of messages posted by:				Discussion forum topics	2nd pilot % & (no.) of messages posted by:			
Mod	**Fac**	**Part**	**Total**		**Total**	**Part**	**Fac**	**Mod**
45	6.7	48.3	100%	Week 1:	100%	59.9	6.8	33.3
(81)	(12)	(87)	(180)	Access & motivation	(237)	(142)	(16)	(79)
39.1	6.1	54.8	100%	Week 2:	100%	68.9	2.4	28.7
(77)	(12)	(108)	(197)	Professional networking	(212)	(146)	(5)	(61)
16.6	12.2	71.2	100%	1st radiation threapy topic:	100%	74.8	8.7	16.5
(26)	(19)	(111)	(156)	Role of RT in the management of breast cancer	(298)	(223)	(26)	(49)
18.0	15.1	66.9	100%	2nd radiation threapy topic:	100%	77.0	6.7	16.3
(31)	(26)	(115)	(172)	Current planning practices for breast cancer	(300)	(231)	(20)	(49)
11.9	21.4	66.7	100%	3rd radiation threapy topic:	100%	82.0	7.1	10.9
(15)	(27)	(84)	(126)	Tattoos or skin marks?	(155)	(127)	(11)	(17)
34.4	15.2	50.4	100%	EBP activities:	100%	63.1	13.7	23.2
(43)	(19)	(63)	(125)	Applying evidence-based practice in RT	(306)	(193)	(42)	(71)
48.1	-	51.9	100%	EBP reflections	100%	73.9	-	26.1
(13)	-	(14)	(27)		(23)	(17)	-	(6)
52.2	-	47.8	100%	Online module reflections	100%	53.7	-	46.3
(12)	-	(11)	(23)		(82)	(44)	-	(38)
63.6	9.1	27.3	100%	Celebration and farewell	100%	43.4	9.2	47.4
(21)	(3)	(9)	(33)		(76)	(33)	(7)	(36)

Note. Mod: Moderator; Fac: Facilitators; Part: Participants

Number of messages presented within brackets


Node Explorer - JsPhd
Node Set Tools View
Browse Properties Attributes DocLinks NodeLinks Edit Set Assay Search
Nodes
All Trees
Trees (48)
Online feelings
Topics of discussion
Module outcomes
retrieve literature
review literature
new online skills
enjoy DF
increase self confidence
enjoy module
increase RT knowledge
learned a lot, worthwhile experience
appreciate EBP
sharing with colleagues
appreciate online network
Reflection model
Sharing
Feelings
positive
negative
Association
Integration
Validation
Appropriation
Reflection outcomes
action
affective
perspectives
Cases (17)
Sets (1)
Title No. Passages Created Modified
Online feelings 1 0 3/6/2005... 3/6/2005...
Topics of discussion 2 0 3/6/2005... 3/7/2005...
Module outcomes 8 0 3/6/2005... 3/6/2005...
Reflection model 9 0 3/6/2005... 3/6/2005...
Trees

Pre-Module Survey

The aim of this survey is to collate information about your views prior to participation in the online module. Information provided here is confidential and will not be used to identify you. Responses will only be reported in aggregated form.

Section A: Background Information (Please **bold** the appropriate number)

1	Gender	Female	1	Male	2	
2	Age group	20-29	1	30-39	2	
		40-49	3	50 & above	4	
3	Current status	Practitioner	1	RT educator	2	
		Other	3	*Please specify*		
4	How many years have you been practising as a radiation therapist?					
5	Have you had any experience in RT planning?	Yes	1	No	2	
6	The last time you participated in formal postgraduate education was:					
		Less than 5 years ago	1	Between 5 & 10 years ago	2	
		More than 10 years ago	3	Never participated before	4	
7	You have participated in online learning before	Yes	1	No	2	

8. For each of the following online activities, please rate your *existing* skill level.

		No prior experience	**Very Low**		**Ave**		**Very High**
(a)	Using a word processor to write a document	0	1	2	3	4	5
(b)	Receiving and sending email messages	0	1	2	3	4	5
(c)	Using electronic databases to search for information	0	1	2	3	4	5
(d)	Using online activities for your own personal or professional development	0	1	2	3	4	5
(e)	Communicating online via discussion forum &/or chat rooms	0	1	2	3	4	5

Section B: Information about learning (Please **bold** the appropriate number)

9 For each of the following statements, please indicate your response.

		Unsure	**Very Low**		**Ave**		**Very High**
(a)	Your ability to share knowledge with your peers is:	0	1	2	3	4	5
(b)	Your willingness to consider alternative viewpoints	0	1	2	3	4	5
(c)	Your ability to consider alternative viewpoints	0	1	2	3	4	5
(d)	Your ability to identify inconsistencies and contradictions in an argument	0	1	2	3	4	5
(e)	Your willingness to change your view in light of “new” evidence	0	1	2	3	4	5
(f)	Your ability to reflect on your professional reading	0	1	2	3	4	5
(g)	Your ability to integrate new knowledge, and experiences into your practice	0	1	2	3	4	5

		Unsure	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
(h)	Reflection is an essential part of learning	0	1	2	3	4	5
(i)	You feel confident in exchanging information with peers	0	1	2	3	4	5
(j)	You feel confident in stating your views	0	1	2	3	4	5

		Unsure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(k)	Quality learning can take place online	0	1	2	3	4	5
(l)	You are motivated to learn online	0	1	2	3	4	5

Section C: Information on workplace culture (Please **bold** the appropriate number)

10. For each of the following statements, please indicate your response.

		Unsure	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(a)	Your workplace is supportive of new ideas and suggestions from radiation therapists	0	1	2	3	4	5
(b)	You are wary of suggesting new ideas as this is frowned upon by colleagues	0	1	2	3	4	5
(c)	Implementation of new ideas is difficult due to financial constraints	0	1	2	3	4	5
(d)	In general, your colleagues are supportive of changes in the department	0	1	2	3	4	5
(e)	Implementation of new ideas is difficult due to the level of red tape involved	0	1	2	3	4	5

Do you foresee any obstacles that may affect your participation in this module?

How do you propose to overcome/minimise these obstacles?

Based on your previous learning experience, what learning strategies will you need to use in this module?

Additional comments

Thank you for completing this survey

Please send as an email attachment to the E-moderator, Jenny Sim, by 30th July 2004

Learning objectives

Learning objectives

1 Radiation Therapy Content

The content of this online module is on Breast Planning in Radiation Therapy. This is a large area that can be divided into sub topics. For the purpose of this module, the RadTOC Team has decided to focus on three main areas:

- Role of Radiation Therapy in the management of breast cancer
- Current planning practices for breast cancer
- Tattoos & skin marks

2 Enhancing your ability to apply reflective practice in your workplace

The traditional model of learning is about how best to transmit knowledge from the expert to the students and expecting students to reiterate the knowledge. However, knowledge is only meaningful to *you*, as a learner, when the knowledge is embedded within the context of *your experience* and *your workplace*[1]. This module focuses on providing opportunities for you, as a learner, to make sense of new knowledge and how it can be effectively applied at your workplace. We achieve this by designing the activities so that you will be *continuously reflecting* on your existing and newly acquired knowledge while integrating your own and your peers' experiences, with the aim of appreciating how this new understanding can advance your workplace practices.

Learning activities

Learning activities are the tasks that you need to engage in to achieve the learning objectives. In the process of learning, you will need to engage in the following learning activities:

- Posing questions that address your workplace practices (the why, what and how);
- Accessing and retrieving relevant information from multiple sources especially via the Internet;
- Reviewing and analysing the information obtained;
- Synthesising knowledge and experience in the workplace and professional practices;
- Articulating, and sharing your understanding with your peers
- Considering the big picture (through discussions of your literature reading and exchanges with your peers on various issues);
- Reflecting on individual and collective learning; and
- Participating in a mini trial run of evidence-based practice.

Learning outcomes

On successful completion of this module, you will be able to:

- apply your knowledge more effectively in the workplace by engaging in reflective practice;
- understand evidence-based practice in the context of radiation therapy;
- use information literacy skills to further enhance your workplace learning;
- communicate effectively online;
- articulate and share your knowledge with your peers; and
- be an effective member of an online learning community.

Jenny
Your E-Moderator

☞ **Please close this message and open 4. Schedule**

[1]Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Workplace survey

Participant has participated in a Radiation Therapy (RT) pilot online module. We have been collecting data from multiple sources to determine the level of impact this module has on the participant and her workplace. This survey forms part of the data collection. As the charge Radiation Therapist of participant, I would appreciate if you could complete this survey.

1. Have you noticed any change in the participant's approach towards RT planning? If yes, please describe the changes.

2. Have you noticed any change in the participant's involvement in staff meetings? If yes, please describe the changes.

3. Have you noticed any change in the participant's information seeking behaviour eg. asking questions of colleagues?
   If yes, what impact has this had upon the learning culture of your workplace?

PTO

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PO Box 71, Bundoora
Victoria 3083

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Email: jenny.sim@ems.rmit.edu.au

4. How has participation in the module contributed to the participant's professional development?

5. Overall, what impact has the participant's learning had on the workplace?

6. Would you encourage other staff to participate in a similar online module?

7. Any other comments.

Thank you for participating in this survey

Please return this questionnaire directly to Jenny in the self-addressed envelope by 31st December 2004

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Victoria 3083

Phone: +61 3 9925 7000
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Email: jenny.sim@ems.rmit.edu.au

9th December 2004

Charge Radiation Therapist

Dear Charge-RT

Re: Workplace Survey for your completion

As you are probably already aware, [Participant] has successfully completed the radiation therapy online module which I am piloting as part of my doctoral study. As the Charge-RT of the Participant, the aim of this letter is to seek your assistance in completing a Workplace Survey.

As this module forms part of my research study, I need to collect data from various sources to validate the outcomes of the online module. Thus, in order to determine the level of impact this module has on the Participant and her workplace, I would very much appreciate if you could complete this workplace survey.

The survey requires only a few minutes of your time. Your responses will be treated in the strictest confidence. All data obtained will be reported only in an aggregated form, so that it will not be possible to identify individual responses. Upon completion of the survey, please return the survey directly to me in the self-addressed envelope. The due date for the return of the survey is 31st December 2004.

Should you require additional information, please do not hesitate to contact me.

Thank you once again for your assistance in this research project.

Best regards

Jenny Sim
PhD candidate

cc Participant

Email: jenny.sim@ems.rmit.edu.au
Tel: (+61 3) 9925 7000
Fax: (+61 3) 9467 8589
RMIT University
Division of Medical Radiations
PO Box 71, Bundoora, Victoria 3088

9th December 2004

Participant
Radiation Therapy Centre

Dear Participant

Re: Workplace Survey for completion by your charge RT

The aim of this letter is to seek your assistance in having your Charge-RT to complete a workplace survey as part of my data collection.

As this module forms part of my research study, I need to collect data from various sources to validate the outcomes of the online module. Thus, in order to determine the level of impact this module has on you and your workplace, I would very much appreciate if you could pass the Workplace Survey to your Charge-RT.

Please find attached the Workplace Survey. If you are comfortable with the survey questions and are happy to have your Charge-RT or RT educator to answer the questions, could I trouble you to pass the Survey and the letter addressed to the Charge-RT or to the person whom you feel are best able to complete the survey accurately.
I understand that in some instances, there may be more than one Charge-RT responsible for you as you rotate through your roster. If that is the case, please feel free to photocopy the survey and the letter to the Charge-RT and pass them on to the appropriate personnel.

However, should you feel uncomfortable with the process, then please feel free to discard the Survey and the letter. Please be assured that it is perfectly acceptable to do so should you wish not to involve the Charge-RT. As this survey is about you, as a participant of this study, we aim to have you to be in control ie. for you to decide if you wish to have the survey to go ahead.

As with all surveys, I may need to send a survey reminder to the Charge-RT. So if you have forwarded the survey, could I trouble you to email me so that I could follow up with a reminder.

Should you require additional information, please do not hesitate to contact me.

Allow me to thank you once again for your assistance in this research project.

Best regards

Jenny Sim
PhD candidate

Email: jenny.sim@ems.rmit.edu.au
Tel: (+61 3) 9925 7000
Fax: (+61 3) 9467 8589

RMIT University
Division of Medical Radiations
PO Box 71, Bundoora, Victoria 3088

Structure of your EBP assignment

We suggest you titled your section and sub-sections of your assignment. This way, it assists the readers in grasping the main points of your work via the headings.

There should be 3 main sections: Introduction, Body and Conclusion.

Introduction
Identify the clinical issue you wish to investigate. What is it that you are looking at and why. ie. why are you interested in looking at this particular issue and the significance (if any) of this topic.

You should end your introduction by condensing your clinical problem into 1-2 sentence(s). That way, you are focused and know exactly what you are after.

Body of assignment: Please title this main heading according to the issue you are looking at. Hence if you are examining the impact of long waiting list, you might wish to start off with a heading: Impact of long waiting list etc. There should be sub-headings to this section too.

In terms of coverage, you must address 2 main areas here.

Part 1: Critique of your selected literature
Did your selected article(s) assist you in answering your question? If not, why not. For instance, the techniques suggested in the article are not suitable in your department because…….. or you may be able to adapt only one aspect of it because…….
What we are looking for here is your ability to critique the article and to see evidence of your ability to analyse how the techniques etc can/cannot be applied at your workplace. Folks, is similar to the critiques you have been doing all along ;-)

It may be that the article you selected does not directly answer the question you are looking for. That is okay too. Don't panic. The article may be relevant in some other way. For instance, it may point towards something that you have not thought of and you realised that it is an issue you should consider. So in this instance, the article is useful as it serves to increase your understanding of the question you are looking at. Although it does not provide you with the solution, it has assisted you in working towards your ultimate goal.

If you find that you have an article that does not in any way assist you, then perhaps the article you have chosen is not relevant. In which case, you do have to search for another one :-(

Part 2: Applying your EBP at your workplace
In this activity, we do not expect you to come up with a solution to your clinical problem. To expect that would be unrealistic. However, that should not prevent us from completing this EBP activity in its entirety. We would therefore like you to assume that you have a solution at hand. ie. you have found a technique that you think will work in your department and you would like to run a trial.

The question is: How do you go about implementing your EBP at your workplace?

(a) You will need to think of the problems you are likely to encounter and therefore need to overcome in order to implement your EBP solution. For instance:
    (i) you may have to convince your ROs first. What about your charge RT? And then you have your colleagues to think about. Certainly, you would need the support of your peers?
    (ii) Another likely obstacle: does the implementation involve injection of cash? Where is the money coming from? How are you going to source that money?
    (iii) Another problem: Your project may require the collaboration of other departments? For instance, in an effort to increase patient awareness of **, you may need to seek the assistance of surgery department? Who do you contact? What are the logistic involved?

    The aim of this section is to steer you toward considering the big picture and to look beyond technical aspects. RTs do not work alone. We work as a team. Thus any decisions and bright ideas we have, we have to work to bring the rest on board with us. By doing so, you are being proactive and not leaving it to the charge RT, but you work together towards your goal.

(b) Having identified your challenges, how do you propose to overcome them?
I will leave the strategies and solutions to you ;-)

A suggestion is to devote equally to Part 1 & Part 2. This is because you are only required to select one article & therefore critique only one article here. However, if you do find more articles and wish to devote more to Part 1 that is fine too. However, in view of the importance of Part 2, please do not skim over it. Sufficient attention must be paid to this section too.

Conclusion
The 1 or few articles you selected are unlikely to solve your problem. In the course of this assignment, you may find that there are other areas and more information you need to explore. You should therefore conclude by identifying your action plan. ie. What do you need to do, address in order to have the solution or to bring you a step closer to your answer.

Have fun Folks and we look forward to reading your hard work!

RadTOC Team
Sally, Paul, Glenn and Jenny

Footnote
Aims of EBP assignment
The above is only a suggested structure to your assignment. Of course, you can vary your style but you must address the following key points

- Identify your clinical issue and why
- Critique a relevant article
- Implementing your EBP by looking at the big picture:
  - What are the likely problems you will encounter at your workplace?
  - Your strategies and solutions to overcome the above obstacles

Referencing
Don't forget folks referencing is a must. ie. you must provide in-text referencing and a reference list at the end of your assignment. Otherwise, one will be guilty of plagiarism! If any of you have any difficulties, please refer to the Harvard Style of referencing (pink sheets) at the end of your Online Module Resource Folder; there are heaps of examples there on how to reference. Or of course you can SOS me! ;-)

Alternatively, you may go to http://www.rmit.edu.au/browse;ID=8rwjnkcmfoeez and click on Harvard style.

Word limits
Our limit: minimum of 1500 and maximum of 3000 words. If you adhere to the aims of this assignment, chances are you will be running close to 3000 words. Folks, this assignment presents as an ideal opportunity to challenge yourself, since this is not a formal assessment, rather an exercise that will assist you in your professional development. ;-)

Optional
In your submission, you are most welcome to include a cover page (ie. title of your assignment, author ie. you etc) and contents page. These are optional.

EBP Assignment Score Sheet

	Score
Introduction	
Clarity of EBP question & why	5
EBP Focus: Part 1 (Relevance of the article to the clinical issue)	
• Critique of selected article	5
• Ability to establish why and how the findings/results listed in article are applicable to the issue at hand (ie. reflection activity)	10
EBP Focus: **Part 2** (Implementation of EBP at their workplace - adopting the big picture)	
• Ability to to anticipate the likely problems/obstacles one is likely to encounter in the event of implementing the EBP at the workplace	5
• Ability to suggest strategies/solutions to counter or minimise the problems (This includes recognising and appreciating that some problems do exist which may have no immediate solutions)	5
Conclusion	
Ability to identify action plan	10
Other	5
Referencing	
In-text & reference list	5
Total	**50**

Note: Participants will only get written feedback from the radiation therapy facilitator. The scoring is for the researcher's data

3-month Post Module Feedback

Thank you for taking the time to complete this survey. 3 months have passed since the completion of the online module. The aim of this survey is to inform the researcher if the learning obtained from that module is still having an influence on your (approaches towards) current workplace practices. Information provided is confidential and responses will only be reported in aggregated form.

1 Since completion of the module, do you have any opportunities to:

(a) continue reading and reflecting on RT literature?

(b) engage in reflective practice at your workplace? Please elaborate.

2 In your EBP assignment and throughout the module, many of you have indicated your desire to explore workplace issues and/or suggest some changes to further enhance practices.

Have you had any opportunity to work towards these initiatives? Yes No

If yes, what have you learned from the process? How is the progress and what are the outcomes (if any)?

3 What impact (if any) has your participation in the module had on you personally and professionally?

4 Any other comments

Thank you for completing this survey

Please send this as an email attachment to the E-moderator, Jenny Sim, by 13th October

Evaluation data	1st pilot participants						
	1	2	4[a]	7	8	11	12
Work practice: Radiation therapy planning							
• Proactive in suggesting ideas and improvements on breast techniques	✓						✓
• Increased awareness and appreciation of complexities of planning				✓	✓		
Behvaiour							
• Engaging in information literacy search	✓			✓			
• Looking for educational opportunities	✓						
• Active in seeking clarification of issues and concerns							✓
• Availing herself to assist colleagues in their online research activities							✓
• Willing to engage in IT					✓		
Attitude							
• Increased confidence	✓			✓	✓		✓
• Positive attitude	✓						
• Enthusiastic	✓			✓	✓		
Professional development							
• Enhanced participant's professional development	✓			✓			✓
Impact of participant's learning on workplace	Yes		Yes	No	Yes		Yes
• Participating in quality improvement activities	✓						
• Encouraging colleagues to participate in CPD activities			✓				
• Contributing towards IT development in Department					✓		
• Making evidence based suggestions to departmental practices, proposing changes and presenting ideas to colleagues in staff meeting							✓
• Disseminating information acquired from online module							✓
EBP assignment							
• Critique of selected literature	✓	✓	✓	✓	×	✓	✓
• Reflecting on literature	✓	✓	✓	✓	✓	✓	✓
• Ability to adopt big picture							
• Ability to identify obstacles in EBP implementation	✓	✓	✓	✓	✓	✓	✓
• Ability to suggest solutions	✓	✓	✓	✓	✓	✓	✓
• Ability to identify action plan	✓	✓	✓	×	✓	✓	✓
3-month post module survey							
• Reading and reflecting on literature	No	No	Yes	No	Yes	No	No
• Reflecting in the workplace	Yes[b]	No	Yes[b]	Yes	Yes[b]	Yes	Yes[b]
• Engaging in EBP activities	No	Yes	No	No	No	Yes	Yes
• Impact on personal and professional practices	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[a]Participant 4: Since completion of module, she has assumed a new role of clinical tutor and preceptor. As such, the workplace supervisor is finding difficulty in commenting on changes relating to radiation therapy planning.

[b]Only Participant 1, 4, 8 and 12 showed evidence of reflecting in the workplace.

Changes as a result of module participation:	2nd pilot participants									
	1	**2**	**4**	**5**	**8**	**9[a]**	**10**	**11[c]**	**12**	**14[c]**
Work practice: Radiation therapy planning										
• From apprehensive to adopting a keen attitude towards planning							✓			
• Analysing plans more and trying new techniques										✓
• Proactive in suggesting new ideas										✓
• Increased awareness and appreciation of complexities of planning								✓		
Behvaiour										
• Seeking for new challenges							✓			
• Adopting evidenced based approach in her quest for knowledge										✓
• Engaging in information literacy search										✓
• Seeking to undertake research & presenting at seminars								✓		
Attitude										
• Increased confidence										✓
• Positive attitude							✓			
• Enthusiastic							✓	✓		
Professional development										
• Enhanced participant's professional development							✓			
Impact of participant's learning on workplace						No	Yes	No		Yes
• Good role model for junior staff and students							✓			
• Keen to involve in technique development										✓
EBP assignment										
• Critique of selected literature	✓	✓	✓	✓	×	✓	×	✓	✓	✓
• Reflecting on literature	✓	✓	✓	✓	×	✓	✓	✓	✓	✓
• Ability to adopt big picture										
• Ability to identify obstacles in EBP implementation	✓	×	✓	✓	×	✓	×	✓	×	✓
• Ability to suggest solutions	✓	×	✓	✓	×	✓	×	✓	×	✓
• Ability to identify action plan	✓	×	✓	✓	✓	✓	✓	✓	×	✓
3-month post module survey										
• Reading and reflecting on literature	Yes	1/mth		No	Yes	Yes	Yes	Yes	No	Yes
• Reflecting at the workplace	Yes[b]	Yes[b]		Yes	Yes[b]	Yes[b]	Not yet	Yes[b]	Yes	Yes[b]
• Engaging in EBP activities	No	Yes		No	Yes	Yes	Yes	Yes	No	Yes
• Impact on personal and professional practices	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes

[a]Participant 9: Overall response is no change as she has always been a keen staff member and is always proactive in seeking solutions to problems encountered.
[b]Participant 1, 2, 8, 9, 11 and 14 showed evidence of reflecting in the workplace.

It all started with an invitation to learn about breast cancer planning techniques. We entered the module as individuals from different centres and countries, but we're finishing as a cohesive group of therapists who have shared information, perspectives and insights in an open, non-threatening environment. The course opened up so many new thoughts and avenues in relation to breast cancer treatment from both a technical and patient care point of view.

It has been quite a journey experiencing a range of emotions. These include anticipation, frustration, disappiontment [sic] and excitement. The anticipation resulted from entering on-line learning which I knew about but wanted to experiencr [sic] first hand. The frustration came from a few technical hitches including at this end! The disappointment [sic] often resulted from reading numerous articles in the hopes of finding a definitive answer, but not! The excitement abounded at being able to complete tasks which opened up a whole new learning experience. From comparing the basics in breast cancer treatment to skin marks to complex 3-D treatment planning, we have all come away from this experience enriched and better informed about breast cancer planning and treatment. Reading through the journals we realize that the breast cancer technique is very complex and will benefit perfectly from the new intensity modulated radiotherapy (IMRT); the oncologists can account now for any type of breast curvature in any dimension hoping for a better dose homogeneity, low dose to the lung and heart, low scattered dose to the contralateral breast....

I think that this is the real value of CPD. With our new skills and knowledge, we hope to improve patient care at each of our centres by focusing on evidence-based practice and continuous education. We have gained more confidence in our ability to research and instigate change, and to embrace new technology.

Thanks to our moderator Jenny and all the support staff who have helped us navigate different obstacles in our learning, and who kept up motivated to finish the module. It has been a great time. Happy Christmas