Portfolios for Longer-Term Learning in Health Professional Education

by

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Certificate of Original Authorship

I certify that the work in this thesis has not previously been submitted for a degree, nor has it been submitted as part of requirements for a degree, except as fully acknowledged within the text.

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Abstract

Assessment practices in higher education for the professions are focused, not unreasonably, on student progress through their various subjects, culminating in testing of discipline entry standards and competencies. This can, however, neglect the considerable need for the new graduate to continue to learn independently following entry to the profession, judging the quality of their own work as they begin to demonstrate professional expertise. Understanding that assessment processes are a key incentive for generating student engagement in learning, this thesis asks how we might use assessment in university courses for the professions to foster longer-term learning into practice.

The problem of identifying and facilitating those learning skills at university that best equip students' ongoing learning and self-assessment as entry level professionals requires a methodology that recognises the contextual nature and complexity of pedagogical interventions. Educational design research was employed for its capacity to allow theoretical questions about learning in context to be addressed as the research unfolded. The vehicle for the investigation was a professional practice portfolio assembled throughout a course. The context of the health sciences and the setting of a two-year program for medical sonographers, allowed the study of three iterative cycles of portfolio design. In each cycle, interventions were implemented to foster self-assessment, independent learning, reflective practice, and the capacity for making judgments and evidencing competence. Analysis of data from participant focus groups, interviews and portfolio entries, drawn from three years of entry cohorts of students, contributed to ongoing design modifications for improvement of the portfolio process. Twelve months following course completion, the continuing learning practices of new graduates in their workplaces were investigated and reconceptualised through a practice theory lens, identifying both resonances

with portfolio assessment, and further avenues for improvement in portfolio practices.

This thesis provides empirical evidence, through iterative research of pedagogical strategies, that students' engagement with a course-long portfolio can positively influence longer-term learning. This is particularly so when it is embedded with supported, scaffolded learning skills. Consideration of the socio-material practices of new graduates offers further insights into ways forward.

Chapter 1 Introduction

This chapter introduces the thesis, which was prompted by an academic issue in a university program, with the problem encountered and the development of the research program to investigate it. The issues of interest, key concepts and contexts under investigation are explained, and the research questions for the thesis are posed. An overview of the content of each of the subsequent thesis chapters concludes this introduction.

The Problem

This research was inspired by an academic dilemma in a university course that prepares students for entry to a profession. Academics working in professional disciplines are inherently involved in ensuring their curricula respond to changes in professional requirements. This thesis emerged from such a change involving new accreditation and registration processes in the health sector that had public safety concerns as the stimulus.

In this case, in a health profession, changes brought about by an accreditation process meant students were entering and leaving the university with significantly less clinical experience than had been the case in the past. Curricula changes were made to attempt to cater for this change; however, the real challenge was to understand and develop strategies, which use the short time students have during their university course to enable them to continue to learn beyond the course.

In professional areas, which prepare students to work with the public in vulnerable areas such as health, a great deal of emphasis is placed on the assessment of students in meeting the requirements to be safe practitioners. Assessment programs in university courses, therefore, come under particular scrutiny in the accreditation-to-practice requirements of professional bodies. In this investigation, assessment of students thus

became the focus of the question of how to use the time students are in the course to foster longer-term learning into early professional practice.

The context, very briefly, is a health science course at an Australian university that prepares students to practice as medical imaging professionals. Considerable changes were taking place, at the inception of this thesis, in the Australian health professions due to government requirements for registration and accreditation. In particular, accreditation requirements in the 2-year postgraduate coursework program in medical sonography that is the vehicle for this research meant students were entering the profession with a great deal less exposure to the field than had previously occurred. Prior to the requirement to hold an accredited qualification in sonography to practice, students mostly entered the course with between two and five years experience in the field, seeing the qualification as a recognition of their expertise in their new profession. After the requirement for accreditation commenced, it was mandatory to be enrolled in an accredited course to commence a training position, thus the entry level of experience dropped from two years to no time at all. It was imperative, therefore, to equip students to continue to learn in the first year or so after graduation, in order for them to cope with the requirements the workplace expects of new graduates. Stipulations regarding assessment of students had also become more specific, and the possibility of the requirement for portfolio assessment was raised, as this had been the case with other professions. This chapter thus begins with a brief consideration of assessment in higher education, portfolio assessment, and some of the associated dilemmas.

Assessment Dilemmas in Higher Education

The assessment of student learning in professional higher education courses tends to have a strong focus on entry to practice. While efforts to encourage future-directed generic skills, such as problem solving and teamwork, are

increasing, they are often a secondary consideration, particularly in the information-packed curricula of professional education. The issue with this focus on entry to a profession is that consideration of learning for students beyond the course may be neglected. This may leave new graduates, in particular, poorly equipped to continue to learn by themselves in the crucial first year or so of entry into their profession. As Boud and Falchikov (2006) argue, the brief of a higher education is surely that it builds a foundation for lifelong learning, saying 'Whatever else it achieves, it must equip students to learn beyond the academy once the infrastructure of teachers, courses and formal assessment is no longer available' (p. 399).

Assessment tasks may also be problematic when they, often inadvertently, encourage less than desirable learning behaviours in students. For example, some assessments such as unseen examinations and multiple-choice testing, may promote behaviours such as rote learning and memorising that do not equip students well to cope with the complex issues that arise in the professional workplace. These sorts of tasks may persist though as they are efficient for the institution and for academic staff. A number of assessment types have been developed, however, that do seek beneficial learning outcomes, but few extend this to considerations of learning beyond the course. The fundamental problem that this thesis seeks to confront is how student assessment might foster longer-term learning in order for new graduates to continue to learn self-sufficiently in their vital early encounters with the professional workplace, and one assessment type, which has been developed in response to such concerns, is the portfolio.

Portfolios

Portfolios are a diverse bunch of tasks, somewhat akin to an artists or architect's portfolio of work, that in education commonly involve the collection of text based artefacts of student work, such as assignments and reports, usually either for use as reflection and development or for display of best work. Portfolio assessment has a long history in education of

responding to the need to have a more personalised account of learning than standardised tests can provide. They have also been implemented to encourage good learning behaviours, as well as authentic and longer-term learning, both in formal learning settings and for personal and professional development. Portfolios are also becoming very important as professional bodies increasingly require portfolios of evidence of continued professional learning to maintain professional requirements. The question of whether portfolio assessment can be used to help in the transition from university to profession has been asked, but not often researched. As David et al. (2001) suggest of portfolios, they should be a logical bridge between university study and continuing professional education, solving 'the lack of continuity between undergraduate and postgraduate education' (p. 535).

Portfolio assessment, given this idea, was taken into consideration as a way forward in the academic dilemma faced. The idea of incorporating longer-term learning skills into a portfolio developed. Portfolios themselves are not without their own issues, and if they are to be effectively used to promote longer-term learning, their emphasis may be better placed on formative assessment and learning skills than on displays of achievement. Further, to fulfil the aim of fostering longer-term learning through portfolios, the interesting problem of which learning skills to embed into a portfolio needs to be considered. A few outstanding examples of programs which foster longer-term learning are drawn upon to inform the questions this thesis addresses, as are the features of a number of learning skills shown to be effective in portfolios.

Of note though is that portfolios are highly contextualised and purpose dependent, and the setting of higher education is complex, so an appropriate approach to researching portfolio for longer-term learning is required. Many options are viable; however, educational design research promised to be a suitable way to generate understandings of complex social interactions in the complex milieu of students, teachers, university settings and

professional workplaces. Importantly, educational design research has a strong emphasis on iterations, testing innovations cyclically over time and with different groups to find robust designs that work in context and which, through the research, generate theoretical understandings of pedagogical practice.

Thus, the question of whether portfolio assessment can foster longer-term learning is taken up by examining some of the issues in assessment practices in higher education. Efforts to improve assessment practices to focus on learning and learning skills are then analysed, and specific learning skills are identified that have potential to contribute to longer-term learning.

The strategies investigated build on contemporary learning theories, and are aimed at positively influencing students' independent learning capabilities (Meeus et al., 2008), to work on building student capacity to make good judgments about their own performance (Hager, 2000), to encourage the capacity for reflection (Hume, 2009), to foster capacity for self-assessment (Klenowski, 1995), to demonstrate professional competencies (Gonczi, 2013), and ultimately to influence longer-term learning (Boud & Falchikov, 2007).

The Issue of Transition

In any professional setting, great changes take place for a person as they move from the status of student to qualified practitioner, or from university student to employee. 'Individual practitioners … are called to manage difficult transitions throughout their careers beginning with the shift from initial professional education to the workplace.' (Fenwick, 2012, p. 1). Zukas and Kilminster (2011) call such transitions critically intensive learning periods. Facilitating this change is more important than ever before as university staff struggle to do more with fewer resources, including reduced

availability of clinical practice/fieldwork/internship capacity to prepare students for workplaces, and teach a more diverse student body which may need more support to make the transition successfully. Employers expect new graduates to be productive from the start and the new graduates may find themselves under stress as they attempt to undertake the new learning that allows them to be an efficient and useful employee. This thesis examines the continuing learning that takes place for new graduates and analyses how the findings relate to the university program.

Research Questions

In framing the initial questions for this thesis, a research program was considered that iteratively introduced learning skills interventions into a portfolio assessment. The overarching research question is therefore:
In what ways can portfolio assessment be used in higher education to develop learning skills during a course, which subsequently foster longer-term learning in early professional practice?

This question allows the exploration of students' interactions with portfolio assessments and learning skills during their time at university, and will facilitate follow-up questions once they are in the workplace to discover if and how continuing learning is facilitated.

A subset of questions will be asked of each of the learning skills:
1. In what ways can the inclusion of a portfolio task asking students to demonstrate evidence of independent learning help raise awareness and ability to learn independently during a course and after graduation?
2. In what ways can the inclusion of a portfolio task asking students to describe a judgment help with judgment-making as students and as they start to make independent judgments in the workplace?

3. In what ways can the inclusion of a reflective task, asking students to analyse prior work and reflect on its implications for future learning, help them to be reflective practitioners both during the course and after graduating?

4. In what ways can the inclusion of a self-assessment task, asking students to assess their own work and reflect on its implications for future learning, help them improve their work during the course and to assess their own work after graduation?

5. In what ways might asking students to demonstrate their own competence help them with gaining competence during the course and in unfamiliar tasks in early professional practice?

These types of questions are based on the foundation that student learning is constructed through social interaction and that participation in social activity is necessary for learning. Consideration of learning as a social activity is utilised in this project using commonalities drawn from contemporary practice theorists' writings, including Schatzki (Schatzki et al., 2001; Schatzki, 2012), Kemmis (2009), Gherardi (2008) and Fenwick (2012). It is a view that knowledge and learning occur through action and interaction with social practices, and contrasts with the ideas of learning as being predominantly an individual activity of the mind, based largely in reflective activity, or as something transferred from teacher to student. As new graduates will need to be followed into practice to see the effects of changed assessment practices, a further question arises as to what they learn and how they learn:

6. What are workplace practices that foster significant learning in early qualified practice?

This study thus focuses on a portfolio task designed to incorporate learning skills for the longer term, with the aim of helping students manage complex learning for and into their future professional practice.

While a study of portfolios across disciplines would be possible, portfolios are diverse, have different purposes and are context dependent. Therefore the empirical work of this thesis focuses, as mentioned, on a single health profession, that of medical sonography. A sonographer is 'a highly skilled medical imaging health professional who utilises ultrasound imaging systems to undertake diagnostic medical sonographic examinations across a range of contexts' (Australian Sonographers Association, 2014). This program is particularly suited to this investigation as it is a postgraduate program with well-developed outcomes which runs over two years allowing a number of iterations to occur that would not be possible in, say, a 3- or 4-year undergraduate degree. It is a professional area in which, like most professions, graduates transitioning from university programs to early graduate work experience an intense learning period which they may find difficult to cope with if poorly prepared. The program is reasonably typical of specialist master's health courses, in which students have profession specific accreditation requirements including competencies to meet as well as university requirements for generic attributes. This particular course, which graduates entry-level sonographers, presented an ideal environment for the research, having an existing portfolio task that had been running successfully for at least 10 years, was fairly minimalistic in style and thus open for intervention, in a course that was one of the largest sonography courses in Australia. The participants in this study are described fully in the next chapter.

Significance of the Study

The significance of this research lies in the investigation of ways in which learning might be fostered through assessment tasks and learning skills, beyond university study and into continuing professional learning.

Whilst portfolios have been researched extensively for educational uses, few studies have used iterative designs involving student and staff feedback to

test, improve and retest interventions and their effectiveness, and even fewer have looked beyond the course into the students' first graduate year. No studies have been identified, despite extensive searching, into portfolio assessment of sonography students and no studies have considered learning through sonographic workplace practices. This study therefore makes an original contribution to knowledge of portfolios for longer-term learning. In summary, the research used the portfolio to explore learning through the following iterations:

Firstly, an existing, minimalistic portfolio assessment task was evaluated as it was first necessary to know what the participants perceived worked well before interfering with an assessment task that had been running successfully for a number of years.

Secondly, portfolio tasks were added to encourage longer-term learning, and explored student awareness and ability with the skills of independent learning, fostering judgment and reflection. It is shown that these learning skills are successful additions to the design of portfolios. They were thus continued on to the next iteration.

Thirdly, further learning skills were added in the next iteration, which were designed to raise awareness of the importance of, and development in the skills of, self-assessment. These led to findings around what students perceive as 'quality' and their perceptions around how 'experience' counts.

Fourth and finally, in the investigation of the how graduates learn after finishing their course, this is the first time workplace practices of a particular health professional group have been investigated through a practice theory lens in order to identify learning opportunities that might be valuable to incorporate back into teaching.

Summary

This thesis explores questions about fostering longer-term learning through students' interactions with a professional practice portfolio through tasks designed to build independent learning, reflection, self-assessment and capacity for judgment in clinical practice. It analyses those designs that best assist students to judge the quality of the work they produce during and beyond the completion of their course, as 'ultimately, the concept of quality needs to relate to works that graduates will produce after their formal studies are completed, as they demonstrate professional expertise.' (Sadler, 2009, p. 48). It investigates issues around portfolio tasks aimed at developing students' capacity to demonstrate professional competencies. In considering their effectiveness after students graduated, it also investigates professional workplace practices for learning as a newly graduated professional and considers how these might be implemented in a further iteration of the portfolio design. The next chapter will consider in more detail the background issues to be taken into consideration in this study.

Thesis Outline

The thesis sets about examining longer-term learning through portfolio assessment tasks in higher education, in particular those designs for learning skills aimed at fostering longer-term learning.

This chapter has provided an overview including the background and aims of the thesis, its place in the discourse of assessment in higher education and the research questions developed, and has identified the areas in which research is under-developed.

Chapter 2 argues that while assessment practices have evolved significantly over the last two or three decades in response to practices shown to be unfavorable to learning, there is still a long way to go to encourage learning

skills for longer-term learning, and portfolio assessment designs for longer-term learning are underexplored. Of many assessment designs with formative purposes, portfolios have been a constant consideration in the literature, and are becoming significant not only within the university but because professional associations are mandating them for evidence of continuous professional education, making them critical to workers. Little research has been done on how portfolio designs might best foster longer-term learning.

Chapter 3 justifies the methodology of the research and outlines the theoretical lenses through which each aspect of the research is viewed, the first being the issue of design for longer-term learning in assessment tasks in university courses, and the second, the use of practice theories to look at learning for new graduates in workplaces.

Following these chapters, chapters 4, 5 and 6 analyse in detail the data collected from focus groups and interviews of the participants over three iterations of portfolio design and the findings from each. Chapter 4 describes the first iteration of analysis, which is an evaluation of the original portfolio from participant feedback, while chapter 5 analyses the second iteration, adding tasks asking participants to provide evidence of their use of reflection, independent learning and judgment. Chapter 6 analyses the third iteration, adding tasks requiring discussion of their self-assessment and plans for future continuing professional education.

Chapter 7 analyses the data collected from the graduate interviews and from the portfolios of participants and analyses data pertaining to learning from workplace practices post-graduation, and discusses how these might add to a further iteration of portfolio design.

Chapter 8 discusses the findings in relation to the research questions and discusses how portfolios can be designed with tasks to promote longer-term

learning. In this chapter, limitations of the study are discussed regarding the research design and context. Implications for practice and policy are presented. Suggestions are made as to how the findings might contribute to the field of knowledge around portfolio assessment in higher professional education, and recommendations are made for future research.

Chapter 9 provides the conclusions from the study.

Chapter 2 Arguing for Portfolio Assessment

Introduction to Chapter

The importance and centrality of assessment to a students' university experience cannot be underestimated, nor can its impact on learning, both present and future. Assessments represent a significant investment of students' time and effort in Higher Education. In programs that prepare students for the professions, assessment inherently tends to be dominated by concerns about the skills and abilities required for entry *to* the profession, such as current knowledge and competencies for entry-level practice, but not often *beyond* it. This chapter argues that given the importance of assessment, it must be harnessed not only for the short time students are influenced by the university, but for the longer term, and particularly for the first crucial years in professional practice. To this end, this chapter outlines as background some of the positive shifts in assessment practices and policy over the last few decades, and discusses the sorts of assessment strategies that might prepare students for longer-term learning. It will be suggested that of all assessment practices, portfolios are regularly acclaimed for their potential to facilitate complex learning during university as well as longer term learning into professional practice. Portfolio assessment itself however, has been subject to similar sways in influence over time, currently suffering under the influence of their use for display of achievements at the expense of learning; it is argued they must do both. Finally, a rationale is provided for the empirical study this thesis employs to incorporate learning skills into portfolio assessment in a particular allied health profession to foster longer-term learning during a university course and on into professional practice.

Changing Assessment in Higher Education

Assessments have been changing dramatically over the last few decades as problems are identified and solutions sought, and as understanding increases about the effects of assessment on students, their learning and their performance following graduation. Substantial shifts have also occurred in teaching and learning; however, it is the testing of the outcomes of teaching and learning (i.e., the assessment) on which students tend to focus, and that may become what they are able to 'do' well. In a system where great emphasis is placed on grades and scores, so called 'high stakes' tests define what is studied. As Yorke (2005) says: 'It is widely appreciated that students' behaviour regarding assessment is strongly influenced by their perceptions of the demands of assessment and of the implications that the assessment regime has for the grading of their performance' (p. 14). For example, if the assessment task is a multiple-choice question that tests particular facts, students become accomplished at memorising facts. This may be of lesser value in the world of work where they will meet complex problems requiring skill sets such as research and teamwork.

Some of the reasons for change to assessment include increasing student numbers and decreasing resources with the massification of higher education, and rationalisation of university funding. Gibbs (2006) attributes some of the poor assessment practices to these factors, as well as to cuts in class contact time. He shows that modularisation of study units has led to increasing proportions of summative assessment (assessment for marks or grades) at the expense of formative assessment (where testing is for checking understanding and feedback on how to improve). These put pressure on using more cost-effective assessment methods 'or simply cheaper methods regardless of their effectiveness' (Gibbs, 2006, p. 16). Other factors he identifies include declining student retention as a more diversified cohort receives less formative assistance and the addition of testing of generic attributes in already content-overloaded courses. These

pressures are also felt by academics whose time devoted to assessment has to be weighed against other pressing demands, and who may have a 'limited appetite for change [...due to...] huge pressures for productivity in other aspects of their role' (Bloxham & Boyd, 2007, p. 6).

A case in point of poor assessment practice is what many think of when encountering the term 'assessment' – the traditional examination – typically a two- or three-hour, closed-book, pen and paper test of knowledge signifying the end of a subject. The 'grades' assigned from the results had a significant impact on subsequent educational and often broader opportunities, not to mention motivation and self-belief. Examinations can be seen as a convenient and efficient process for summative assessment, that is, for determining results (marks or grades) at the end of a period of teaching, in a reliable and defendable way. However, they may persist in 'default mode' because assessment has always been done that way, or remain entrenched because of a widely held attitude that this is the way assessment should be done; as Sambell et al. (2012) remark: '... the conventional form of closed-book unseen exam is often seen as the benchmark for rigour and standards' (p. 34). It has been well argued that exams are poor assessments that result primarily in approaches to student effort that emphasise short-term tactics involving rote memorisation of disparate 'facts', what has become known as a 'surface' approach to learning. Biggs (1999), for example, points out that assessment activities frequently result in 'fragmented outcomes that do not convey ... meaning' (p. 60). Instead, he advocates strategies for teaching and assessment that focus on the student, particularly those 'assessment tasks [that] tell students what activities are required of them' (Biggs, 2012, p. 39). Calling for approaches that synchronise teaching methods with assessment tasks in a system of 'constructive alignment' (Biggs 1996), the influence and ongoing relevance of Biggs' work is evident from the repeat publication of his 1999 article in the journal *Higher Education and Research Development* (HERD) in 2012

(Grant & Macfarlane, 2012) and in its sustained position in the 'most read' and 'most cited' columns of that journal.

Assessment Policy Shifts

One of the significant shifts in assessment practice that ensued in the decade and a half between the two instances of the publication of Biggs' article was the move from a typically norm-referenced grading system to a criterion-referencing method. In norm-referencing systems, students are judged in terms of their relative position in their cohort, rather than in terms of what they know or can do in relation to the subject material of the test. As it was increasingly understood that this was inappropriate, the emphasis shifted towards criterion-based systems, in which marks are attributed against specified documented criteria, showing how well students did against the task set, rather than against each other. In a more recent development, these criteria have been increasingly provided to the students prior to the assessment, making assessment tasks more transparent.

This change from norm- to criterion-based referencing is readily apparent in the assessment policies of major Australian universities over the last 10 years. A 2007 study of the publicly available policies of a number of Australian universities serves as a baseline to illustrate this change (Clarke & Cox, 2007). Policy provides insights into the beliefs at the time and its analysis '… can illuminate our understanding … [of] … the very real and powerful practices that are in play' (Nicoll & Edwards, 2004, p. 46). In their 2003 assessment policy document, for example, the Queensland University of Technology (QUT) (2003) describes the institutional change to a 'new' approach of criterion-referencing, stating it should be the basic mechanism for design and execution of assessment. It went on to state: 'it will be normal practice that staff will check the spread of grades or scores being generated by criterion-referencing methods', perhaps reflecting a resistance to let go of entrenched practices. At The University of Sydney, the equivalent

'resolution' of the time stated that examinations were widely regarded as 'efficient' ways of attributing a grade to a student while other methods were time-consuming for staff who would be better employed pursuing 'other valued activities' (University of Sydney, 2004). In contrast, at the University of South Australia (UniSA) (2004), the assessment policy stated that no more than 70% of the final assessment in a subject could be by examination. Course Coordinators also had to provide an appropriate educational rationale to conduct examinations, and Schools had to seek formal exemption if they were used.

In the intervening decade, analysis of the underlying concepts of criterion-based marking processes has led to the conclusion that the standards to which criteria are met are still invisible to students. Thus, momentum has turned towards levels of achievement, or standards. Despite arguing the futility of current attempts to write standards in educational settings, Sadler (2014) nevertheless provides useful definitions:

> A criterion is a property or quality used in appraising student responses to assessment tasks, whereas a standard is a minimum achievement level used as a reference point when judging the quality of a student's work so the appropriate code can be assigned to it … standards are underpinned by criteria (as qualities)' (p. 274).

The 'code' Sadler refers to is the scheme attached to the levels reached, for example, the commonly used High Distinction; Distinction; Credit; Pass; Fail scheme and similar formats. The use of learning outcomes in subject outlines and program documentation is one way of explicating standards, as are commonly available assessment rubrics; both have become normal practice. The generic attributes a student should gain from a university education is another example of standards (Hughes & Barrie, 2010). Recently, attention has turned to minimum standards in entire discipline areas, both nationally (e.g., the COMPASS program of standardising

competencies in Speech Pathology across Australia - http://www.speechpathologyaustralia.org.au/resources/compassr) and internationally (such as the AHELO study conducted by the OECD - http://www.oecd.org/site/ahelo/). The idea that standards are useful has been widely adopted, with the result that most universities' policies now reflect this move to standards-based assessment. For example, QUT (2013) states in their policy that assessment 'reflects rigorous academic standards associated with the discipline and is based on predetermined and clearly articulated criteria, associated standards and weightings'. Similarly, The University of Sydney's (2014) assessment policy now states the principle that 'assessment tasks are … appropriate to disciplinary and/or professional context' and that evaluation should be '... solely on the basis of students' achievement against criteria and standards specified to align with learning outcomes' (University of Sydney, 2014). Furthermore, University of South Australia (2014) believes: 'good assessment requires clear articulation of purpose, requirements, standards and criteria'.

A caution has been issued regarding the use of criteria and standards, particularly when they are being applied to assessment. In a significant study of the grading policies of 65 universities across Australia, Canada, New Zealand, South Africa, Sweden, United Kingdom, and the US, Sadler (2005) argued that creating and assessing standards is not a panacea; it still involves judgments of the level to which standards are reached, typically based on the significant experience of the teachers creating them. He points out that: 'at the very heart of all grading processes, criteria-based included, lie the professional judgments of university teachers as to the standards that are employed' (p. 189). He addressed this again recently (Sadler, 2014), emphasising that regardless of how finely detailed educational standards are, they are still subject to interpretation by users, and this needs to be understood and managed (p. 189). This raises a question: If those who use the standards to assess student work do so from a background of extensive experience, how are students, devoid of such experience by definition, to

make sense of them? Even when students make the effort to read the curriculum objectives in their program outlines, statements of expected standards in their course outlines or the criteria provided with their assessment tasks, they need help to understand them. As Yorke (2003) points out, these written standards are '… generally insufficient to convey the richness of the meaning that is wrapped up within them. Exemplifications and discussion are needed for understanding' (p. 280). And even if detailed descriptions of standards are provided, and there is sufficient engagement between teachers and students creating a shared understanding of them, students remain dependent upon those making the judgments to set the standards; this prevents them from learning to find the standards on their own and identifying what they need to fill their learning gaps to meet these standards. This last point will be developed later.

Formative Assessment

Recognition of the unintended effects of examinations and other such summative assessments turned attention to formative assessment, that is, from assessment *of* learning to assessment *for* learning. Developing out of the seminal review conducted by Black and Wiliam (1998) in schools, this idea has filtered extensively into the higher education literature (e.g., Boud, 2000). Black and Wiliam (1998) advocated for instructional environments centred on the use of formative assessment to establish *where a student was up to in their learning* and helping them find where they needed to be. They identified it as a powerful way to help students to learn, and asked teachers to consider formative assessment as information generated in order to close the gap between actual and desired levels of performance (p. 543). This contrasts with summative assessment, which has no useful information for students on how to improve because it is converted to a grade or number. As one of these authors, Wiliam, more recently wrote: 'It is only through assessment that we can find out whether a particular sequence of instructional activities has resulted in the intended learning outcomes'

(2011, p. 3). Thus, while assessment is a necessary part of the learning process, its purpose in the diagnosis of learning needs should outweigh that of attributing grades. Developing formative assessment in higher education is not enough, however, as it is widely recognised that students align their efforts with their perception of those assessment processes that lead to marks. This plays a key role in how they spend their learning time, as discussed above. Assessment has also been called 'the hidden curriculum' (e.g., Joughin, 2010) because of its significant influence on what students perceive as most important to their learning habits. A number of other terms have been invoked to describe the impact of assessment on student learning, for example, Learning Oriented Assessment (Carless, 2007).

The inference from the uptake of formative assessment is that the student will receive feedback on the gaps in their learning, will know what to do with the feedback, and will source help to fill these gaps. This has resulted in increased efforts in this area in higher education, driven not only by the requirements of formative assessment, but also by the fact that students consistently report this as one of the least satisfactory aspects of their university experience. One report on the first year experience in Australian universities, for example, states: 'One of the troublesome and perennial teaching issues is that many students do not believe they receive feedback on their progress' (James, Krause, & Jennings, 2010, p. 59). In higher education, written feedback has attracted particular attention because of its increasing importance as one of the few modes of communication between teachers and students. As Nicol (2010) reports, it 'often has to carry almost all the burden of teacher-student interaction' (p. 501). Arguing for a view of feedback as a dialogue, rather than a monologue from teacher to student, Nicol advocates pedagogic strategies to provide opportunities for students to practise giving and receiving feedback, and actively working with it to make judgments about the quality of their work. Higgins, Hartley, and Skelton (2002) demonstrated that students, as 'conscientious consumers', do intrinsically value feedback and make attempts to use it to improve future

work, while Taylor and Burke da Silva (2014) found individual written comments to be the most useful form of feedback. Such studies contribute to Boud and Molloy's (2013) assertion that a new era in the conceptualisation of feedback has begun, one that places students as active agents in managing feedback information. They identify feedback 'as a complex *system* that needs to permeate the curriculum, rather than an activity that appears within it from time to time' (p. 25, italics in original).

Formative assessment on its own does not consider the weighty influence of assessment on student study behaviours. In their early influential text, Brown and Knight (1994) showed that not only does assessment tell students what to regard as important, strongly influencing how they spend their study time; it also affects 'how they come to see themselves as students and graduates' (p. 12). Students focus their efforts on what 'counts for marks', and separate activities for formative and summative assessments, having been eroded through lack of time and resources in higher education, are no longer viable. Assessments need to encompass both formative assessment for learning and summative assessment for certification. As Boud (2000) has argued, assessment must do 'double duty':

- They have to encompass formative assessment for learning and summative for certification
- They have to have a focus on the immediate task and on implications for equipping students for lifelong learning in an unknown future
- They have to attend to both the learning process and the substantive content domain (p. 160).

It is not difficult to source good advice on many aspects of assessment and assessment practices. In the UK, for example, the 'Manifesto for Change' (Price, O'Donovan, Rust, & Carroll, 2008) called for greater emphasis on assessment *for* learning rather than assessment *of* learning. The manifesto called for a move beyond a system of grading towards valid assessments of

program outcomes that recognise the limits of standards, for processes to actively engage both staff and students in an integrated dialogue about standards so students could develop their own, and greater development and sharing of standards in disciplinary communities. In Australia, Boud and Associates (2010) developed seven propositions for reforming assessment called *Australia 2020*, and argued that assessment has greatest effect when:

- assessment is used to engage students in learning that is productive
- feedback is used to actively improve student learning
- students and teachers become responsible partners in learning and assessment
- students are inducted into the assessment practices and cultures of higher education
- assessment for learning is placed at the centre of subject and program design
- assessment for learning is a focus for staff and institutional development
- assessment provides inclusive and trustworthy representation of student achievement (Boud and Associates, 2010).

Similarly, Price, Handley, Millar and O'Donovan (2010) discussed 'assessment literacy', which they perceive as an appreciation of the relationship of assessment to learning, understanding of valid assessment, feedback practices, the nature of criteria and standards, skills in peer and self-assessment, and the judgment to select and apply appropriate approaches and techniques to assessed tasks.

These examples show there is no shortage of good advice for assessment practices that harness the best of student behaviours towards assessment, encompass assessment *for* learning and develop the capacity for students to

cultivate their judgment, to help them to continue to learn into the future. This leads to the question of how to design assessment tasks that encapsulate these ideals.

Assessment Design for Learning

It has been argued that of all the various aspects of curriculum implementation, assessment is the most under-developed, particularly in professional learning (Yorke, 2005). However, there is now an increasing foundation of works arguing the case for good assessment practice, which has led to learner-centred assessment designs. Hounsell, McCune, Hounsell, and Litjens (2007) in their UK study looked for innovative assessment strategies and found presentations and portfolios to favour a learner-centred approach. Other assessments have been reported to help students gain feedback on their work, allowing them to check their progress, determine the standards required, and gain the grades they perceive as so important to their immediate future. What is most noticeable, however, in the ideas around student-focused assessment design, is the focus on assessment *during* the university experience. As outlined in the Introduction, it is less common to find ideas about assessment for learning *beyond* the university. Ideas about the need to look at fostering learning beyond graduation, to prepare students for learning in their professional life, are taken up in the next section.

Longer-Term Learning

While it is not a new concept that learning, teaching and assessment at university level should prepare students for life (e.g., Rowntree, 1987), the shift from 'university for some' to 'university for most' in the interim has made ongoing professional learning and life-long learning skills imperative. Many have argued for this longer-term emphasis in an age in which students need to be prepared for an unknown future in jobs and professions

that do not even exist yet (e.g. Barnett, 2004). Whilst this is doubtless true, the focus in this thesis is on early professional practice as confidence and expertise develops. Boud and Falchikov (2006) convincingly argued that the 'short-term focus must be balanced against a longer-term emphasis for learning-oriented assessment to foster future learning after graduation' (p. 399). The professions echo this call; for example, in healthcare, as Australia continues towards an ageing population: 'the changing health care environment is driving the need for expanded roles and responsibilities of practitioners. This highlights the importance of professional educational reform to meet these challenges' (Ng, White, & McKay, 2008).

Assessment must serve both students and the institution well during the time students are at university; however, the importance of the role of assessment in learning into professional practice and for the longer term must also be recognised. One standout example of a focus on longer-term learning is seen in the programs of Alverno College in Milwaukee in the United States. Their commitment to 'learning that lasts' is extensively documented over many years (see Mentkowski and associates, 2000). Their emphasis is on whole of curriculum learning, integration that includes staff and student personal development, and four identified areas of focus for learning that lasts. They hold that learning that lasts is *integrative*, involving developmental strategies for both teachers and students, and that teaching, learning and assessment are coherent. They encourage students to work actively together with teachers to construct broader principles from concrete experiences that are meaningful to them. In fostering students' increasing levels of responsibility for their own learning and abilities, they believe learning that lasts has a strong emphasis on *reflective processes and self-assessment*. They find: 'a successful active and reflective learning process includes learner engagement, self-assessment, and feedback. Reflective self-assessment helps learners to shape future performance, based on understanding both their past and present work and their intellectual processes' (Mentkowski et al., 2000, p. 233). They regard

reflection as thoughtful consideration of students' growth as learners who are striving for a professional identity. They make criteria for judging performances in professions visible to students, enabling them to develop an increasing capacity for *judgment*. Finally, they believe tasks that assist lasting learning require *independent learning* with collaboration.

> Students cannot learn to think or solve problems just by listening
> to the most informed professor or reading the most erudite text.
> They test and develop their thinking by thinking aloud; that is,
> they learn principles of effective problem solving by addressing
> business problems or designing plans for civic action (Mentkowski
> et al., 2000, p. 240).

Distilling the main ideas from this, a list of learning skills can be extracted: independent learning, self-assessment, judgment and reflection, with a prominent emphasis on integrated learning. These skills may be suitable for inclusion into portfolio assessment to facilitate longer-term learning. Each skill is supported by an extensive body of literature, and a brief summary of each is now given.

Independent learning

Implicit within the desire for students to take their learning into the longer term is the need to facilitate the development of responsible, independent learners. Learning independently is necessary to produce the life-long learning objectives that are ubiquitous in most course aims and necessary to meet most professional standards. Independent learning encompasses tasks that encourage learners to manage their learning to achieve their academic goals and includes the notions of self-regulated learning and autonomous learning, among others. Each has its own origins and nuances but encompasses the essential ideas of actively seeking the resources needed to discover and learn for oneself.

Zimmerman (2002), for example, criticises some teaching approaches for not allowing students the freedom to choose their own tasks or evaluate their own performances. He argues:

> … research shows that self-regulatory processes are teachable and can lead to increases in students' motivation and achievement; [however] few teachers effectively prepare students to learn on their own … Students are seldom given choices regarding academic tasks to pursue, … rarely asked to self-evaluate their work or estimate their competence on new tasks.' (p. 69).

Conversely, he considers that independent learning processes increase student motivation and thus achievement.

Self-assessment

By practising self-assessment, students examine how they perform and improve against their previous attempts, against criteria and standards, their peers and their own goals. The use of 'self' is a little misleading, given that to self-assess usually involves actively seeking the help of resources and other people. It is an important skill to develop because it is not inherently done well. As Dunning (2004) says:

> … self-insight about skills and knowledge is modest. Complete strangers armed only with scant information about an individual can predict that person's skills and abilities almost as well as he or she can, despite the fact that the individual has a lifetime of self-information to draw upon (p. 71).

Klenowski (1995) views self-assessment as encompassed by the broader concept of student self-evaluation, which she defines as 'the evaluation or judgment of "the worth" of one's performance and the identification of one's strengths and weaknesses with a view to improving one's learning outcomes' (p. 146). Judging worth can be facilitated by activities that involve appraisal of work against peers, engagement with criteria and standards and

feedback from teachers and mentors. Most importantly, self-assessment identifies gaps that can be subsequently addressed.

In professional practice, Eva and Regehr (2005) conceptualise self-assessment as identifying one's weaknesses and strengths. Where professionals identify their own limitations, they can, for example, provide a referral to a colleague with more experience in an area; alternatively, where the identified limitations fit into the traditional continuing education model, they can seek appropriate educational experiences. Self-assessment also continuously develops professionals' skills of assessing their strengths, providing them the confidence to select the right action plan. Reflecting on self-assessment also allows professionals to choose learning activities that challenge their existing knowledge. Nevertheless, Eva and Regehr acknowledge that '…self-assessment is a complicated, multifaceted, multipurpose phenomenon that involves a number of interacting cognitive processes.' (p. s47).

Judgment

Professionals make judgements routinely in their area of expertise, therefore it is important for higher education to prepare them to do so. The difficulty is, however, that the student is dependent on others to guide them as to whether their judgements are appropriate or not, particularly as novices. A further difficulty lies in the fact that because judgement making occurs in a social context, such as a clinical placement or workplace, it has 'inherently social and political dimensions' (Hager, 2000, p. 291). Students may, therefore, be reluctant to make such judgements on their own, knowing they are subject to close scrutiny. The problem may then become that they are always reliant on teachers or senior colleagues or authorities for guidance. Raising students' awareness of judgements, usually through judging their own work or through case scenarios of clinical decision-making exercises is important for developing this capacity.

Reflection

Following Schön's (1983, 1987) early work on the reflective practitioner, utilising reflective practice to enhance student learning has developed in professional courses. At its best, 'it is about learners constructing their own meanings within a community of professional discourse' (Boud, 1999a, p. 123); however, this author explains that even at its best, tensions exist between reflection, where students explore uncertainty and lack of knowledge, and assessment, where one's best work is presented. Whilst not without its limitations and challenges when put in practice, reflection can be a powerful tool, especially when combined with student self-assessment.

Assessment developments in professional education

While the developments in assessment outlined above have been taking place in the higher education sector, developments have also occurred in education for the professions. Although an in-depth review of factors and trends in professional education is beyond the scope of this section, a brief overview will be provided for context and to explain the place of competencies in higher education programs. Many professions have traditionally relied on university graduates for their workforce, and as such, have had an increasingly have a strong voice in the preparation of the new graduates they wish to employ. In recent years in particular, an increasing number of professional and quasi-professional courses (e.g., nursing and traditional Chinese medicine) have moved under the university umbrella, as governments call for institutions to adopt an agenda of employability through 'increasingly active partnerships between higher education institutions and the worlds of industry, commerce and public service' (Dearing, 1997, p. 43). Courses are progressively being restructured to meet changing student and employer needs. 'Curriculum is being developed in consultation with employer groups and degree programs are often "badged" for specific occupations' (Nelson, 2002, p. 9). Employers are asking for outcomes to be more aligned with workplace needs, and the professions have argued for assessment strategies to ensure competence for practice:

In some subject areas (such as medicine, nursing, social work and teacher education), the development of professional practice is built into curricular structures, and students qualify as professionals provided that they demonstrate that they have developed an adequate level of professional capability in the relevant workplace (Yorke, 2005, p. 6).

In the health professions, for example, the need for universities to equip students for professional practice has been long-standing. Frenk et al (2010) outline a century of educational reforms in health education as background to arguing for further change: 'What is clearly needed is a thorough and authoritative re-examination of health professional education' (p 1923). In recent times, university responses to such problems have included implementing radical changes to their learning and teaching programs, such as the use of problem based learning (PBL) and high fidelity simulations of clinical encounters. PBL, for example, has had a major impact in medical programs, as Spencer and Jordan commented in 1999: 'Problem based learning is gaining in popularity as both an educational method and a curricular philosophy … (and) … has been described as one of the most significant developments in professional education' (p. 1281). PBL, both in entire programs and within courses and subjects, has now become commonplace across health disciplines and beyond. One of the key elements of PBL (and indeed a number of similar strategies under various names) is that it is based on real-life problems, and assists students to pose questions, research their answers and reflect on the process. This is designed to promote a stimulating, self-directed, learner centred approach (Spencer and Jordan, 1999, p. 1282).

Along with the ideas of self-assessment, reflection and PBL, preparing students for the professions has led to a great deal of consideration of the notion of competence: 'Much work has been done, particularly in Australian professions, to develop competency standards for entry-level practitioners'

(Gonczi, 1994, p. 27). The assessment of the practitioner as competent and therefore safe to practice has increasingly become the task of university courses, at least at the level of entry to the profession. Many university courses in professional fields must integrate these competency standards in order to meet professional accreditation or registration processes. Recognition of the complexity of assessing competency within university structures is ongoing (Gonczi, 2013). Not only is the assessment of competency closely related to professional work, as Yorke points out:

> …a critical issue in some areas (e.g., health-related professions, social work, education) is the need to assess with an eye to the implications of the assessment outcome for public safety. In these areas, the consequences of passing a student who becomes a bad practitioner can be severe (2005, p. 16).

While there are many and conflicting ideas about the nature and use of competencies, Gonzi argues that assessment of competency is a leap forward in using assessment to foster learning for practice:

> …a competency-based approach to assessment of professionals is potentially (and in some cases, actually) more valid than traditional approaches. That is, it enables us to come closer than we have in the past to assessing what we want to assess—the capacity of the professional to integrate knowledge, values, attitudes and skills in the world of practice (1994, p. 28).

Thus, whilst the assessment in many professional courses must ensure entry-level competence, the assessment process must surely also ensure that the student has the skills to take continued learning into their professional practice. As previously alluded to, under the notion of assessment doing 'double duty', thinking in assessment reflects this trend towards creating environments for lifelong learning. Boud and Falchikov (2006) argue, 'What is missing … has been a conceptualisation of the place

of assessment in learning beyond the academy and the contribution higher education can make to it' (p. 400).

Assessment types for longer-term learning

Returning briefly to the discussion of Biggs' (1999, 2012) work on constructive alignment (as discussed under the heading Changing Assessment in Higher Education), his idea is illustrated by the two methods he shows successfully exemplify it – PBL and the 'learning portfolio'. One of the innovative assessment types of Hounsell et al. (2007) was the portfolio. Portfolios have been advocated in the change from norm- to criterion-referenced assessment, and they have become increasingly big business in demonstrating competencies for professional registration. In their study of multicultural competencies for example, Coleman et al. (2006) state: 'The development of … competence is a process that occurs over time, and portfolios lend themselves well to a longitudinal process' (p. 30). This section will argue for portfolios as a very suitable assessment for encouraging Mentowski et al.'s (2000) *integration* and for introducing the learning skills that these same authors attribute to 'learning that lasts'.

Discussing his ideas on learning in light of constructivist theories, Biggs (1996) argues that regardless of the differences in the theories that might apply, all would agree that learners arrive at meaning by seeking out knowledge and experience, and testing ideas through reflective activities in thought and in social environments; 'actively selecting, and cumulatively constructing, their own knowledge, through both individual and social activity' (p. 348). His empirical example of the use of a portfolio for which students select evidence to demonstrate their learning outcomes and provide a justification for the selection shows the student's ability to create and demonstrate understanding of their learning (p. 52). The use of portfolios in fostering desirable learning characteristics is a prominent and recurring thread throughout the two or three decades of changes in assessment in higher and professional education discussed above.

Portfolios figured prominently as an alternative to traditional assessments, during the transition between norm-referenced and standards-based assessment discussed previously. Baume and Yorke (2002), for example, noted that portfolios 'are seen as having advantages over exercises and examinations that are related less closely to the demands and realities of professional life' (p. 7). In Black and Wiliam's (1998) call for support of formative assessment, a prominent section on portfolios identifies them as closely associated with a reaction against the impact of high-stakes, standardised assessment. Highlighting the vast literature associated with the portfolio movement in the US for testing school-based learning, they identify it as an attempt to satisfy accountability demands without the pressures of standardised tests (p. 45). In this broader context, Daro (1996) addresses the prominent place of portfolios in creating a shared understanding of standards:

> Using national curricular standards to assess students' portfolios holds much promise for bringing standards into the regular discourse between student and teacher, among teachers, and between educators and the public. This promise has prompted widespread work in the development of portfolio assessment (p. 241).

Similarly, in Yorke's (2003) explanation of formative assessment for higher education, which he felt at the time was not as well understood as it was in education more generally; he says it helps students to appreciate the standards expected of them. He draws attention to informal formative assessment events, which might not be part of curriculum design, but which can be important in learning if added to a portfolio and subject to reflection.

Often, portfolios that have been introduced have been mandated by professional requirements; for example in the UK, the use of portfolios 'may have been prompted … by the move towards competence-based assessment

and the introduction of National Vocational Qualifications (NVQs), where the emphasis is on evidence of achievement, rather than the educational processes undertaken by the learner' (Challis, 1999, p. 371). Policy influencing practice, as illustrated in the Assessment Policy Shifts section above, has become a major influence in current times.

The next section will explain the diversity of portfolios and examine what they are and how they work. It will be argued that, when designed well and utilised particularly for purposes of learning as opposed to summative assessment, they can be suitable for developing in students learning skills that foster learning into the longer term.

What is a Portfolio?

As discussed above, portfolios have been increasingly adopted in higher education over the last two to three decades, initially as innovative vehicles for stimulating learning and more recently to present evidence of achievement. In many cases, they are seen as a reaction to assessments such as exams.

Briefly, the Oxford English Dictionary's (2006) definition of the term 'portfolio' identifies a wide range of meanings, from a simple carry case to a body of high-level ministerial responsibilities. The definition includes:

> A case or stiff folder for holding papers, prints, drawings, maps, etc. … Sometimes in the form of a large book … A selection of artwork, reproductions, etc., contained in such a case. Hence: a collection of samples of a person's work, typically intended to convey the quality and breadth of his or her achievement in a particular field.' (*"portfolio, n."* italics added).

The simple 'carry case' containing artworks or technical drawings is how we often envisage an artist or architect presenting their works. However, these portfolios now tend to be electronic.

In education, the idea of a collection of works in a portfolio is not new; the focus has long been on quality and breadth of achievement, as well as learning and reflection. Paulson, Paulson and Meyer's (1991) early work *What makes a portfolio a portfolio?* on primary school writing, proposed that a portfolio is 'a purposeful collection of student work that exhibits the student's efforts … the collection must include … evidence of self-reflection' (p. 60). In higher education, Egerton, Hutchings and Quinlan's (1991) *The teaching portfolio,* a guide written for the American Association for Higher Education, says portfolios can capture complexities of professional practice:

> At the heart of the portfolio as we envision it are … artifacts and examples of what (teachers) actually do … portfolios should be reflective: work samples would be accompanied by … commentary and explanation that reveal not only what was done but why, the thinking behind the teaching … (Egerton et al., 1991, p. 4).

The benefit of portfolios perceived by these authors goes beyond a display of best work to a deeper engagement with the material: 'reflection on their own practice and how to improve it … is the single most-cited benefit of portfolio use to date'
(p. 6). Similarly, Wolf (1989), in searching for alternatives to standardised assessment, emphasised the learning potential of portfolios to foster 'the reflective self-evaluation that is inseparable from pursuing virtually any kind of worthwhile work' (p. 35).

Egerton et al. (1991) advise teaching faculty to keep a portfolio akin to those 'kept by architects, designers, painters and photographers to display their best work' (p. 3). A later, much-cited text on assessing learning gives similar advice: 'Portfolio based learning is essentially a collection of evidence ... The term comes from fine art and graphic design where students collect together examples of their work' (Brown, Pendlebury, & Bull, 1997, p. 187).

Following these early examples, portfolios have been adopted extensively, though usually in text-based formats, in higher professional education, as

valuable tools to help students learn for their future practice. The recent growth of portfolio use is evident, for example, in two reviews of the effectiveness of portfolios, which found some 5,000 initial citations in undergraduate and postgraduate courses in the health professions alone (Buckley et al., 2009; Tochel et al., 2009). This uptake has been attributed to their authenticity, validity, credibility and the richness of the information supplied by portfolios (Driessen, Van Der Vleuten, Schuwirth, Van Tartwijk, & Vermunt, 2005, p. 215). Many are implemented with an emphasis on the formative aspects of learning, such as in Harland's (2005) study in which the portfolio aimed to provide a space for '…the *process, rather than the outcomes*, of learning' (p. 327). Such is the diversity of portfolio tasks, however, that an account is given next of the attempts to categorise their many varieties.

Portfolio diversity

Educational portfolios encompass a great diversity of labels, many and varied tools and an array of pedagogical intentions. Investigating teacher education, for example, Meeus, Van Looy, and Van Petegem (2006) express exasperation with 'at least 49 different nomenclatures used to describe particular types of portfolio … and 28 different classifications' (p. 129). In her guide for medical educators, Challis (1999) highlights the range, from simple repositories of artefacts to deeply reflexive personal and professional accounts. She identifies some as little more than a logbook, while others 'offer an in-depth and long-term perspective on professional development over an extended period' (p. 370). Further, she finds portfolios might be private or public, externally evaluated or assessed, or for individual reflection only. Regarding their use for preparing students for practice in the professions, the value of portfolio use has been explored across educational levels. In the undergraduate education context, evidence has shown improvement in students' ability 'to integrate theory with practice' (Buckley, Coleman, & Khan, 2010), while in the postgraduate education context, portfolios are reported to be 'increasingly important in professional

development' (Baume & Yorke, 2002, p. 7). Portfolios have also been seen as a logical bridge between university study and continuing professional education, due to solving '…the lack of continuity between undergraduate and postgraduate education … (which)… should be consistent with progression from technical discrete abilities to full integration of professional competences …' (David et al., 2001, p. 535).

To make sense of this diversity, a number of categorisations have been suggested. Meeus, Van Petegem, and Engels (2009), for example, draw a distinction between those portfolios aimed at demonstrating professional competencies and those aimed at learning pedagogies. They stress that while professional competencies are well embedded in most professional courses, less recognition of the importance of learning competencies exists despite their importance to life-long learning. These are the 'learning to learn' abilities, which '… include skills to work independently, the ability to plan, the capacity for reflection, being able to modify one's behaviour' (p. 402).

A further useful distinction of the intended purposes of portfolio tasks across educational and professional settings is made by Smith and Tillema (2003), who categorise portfolios as dossiers (of achievements), training portfolios, reflective portfolios or personal development portfolios. They also look at the intentions of particular portfolio tasks, positing the existence of two continua. The first continuum is that from mandated uses at one end to voluntary uptake at the other, while the second has a learning development focus at one end and a focus on the use of selected evidence for achievement and certification at the other. This is shown in Figure 1.

selective (promotion, certification)
purpose

Dossier

Reflective Portfolio

Mandated

Voluntary

use

use

Training portfolio

Personal Development Portfolio

Learning, developmental
purpose
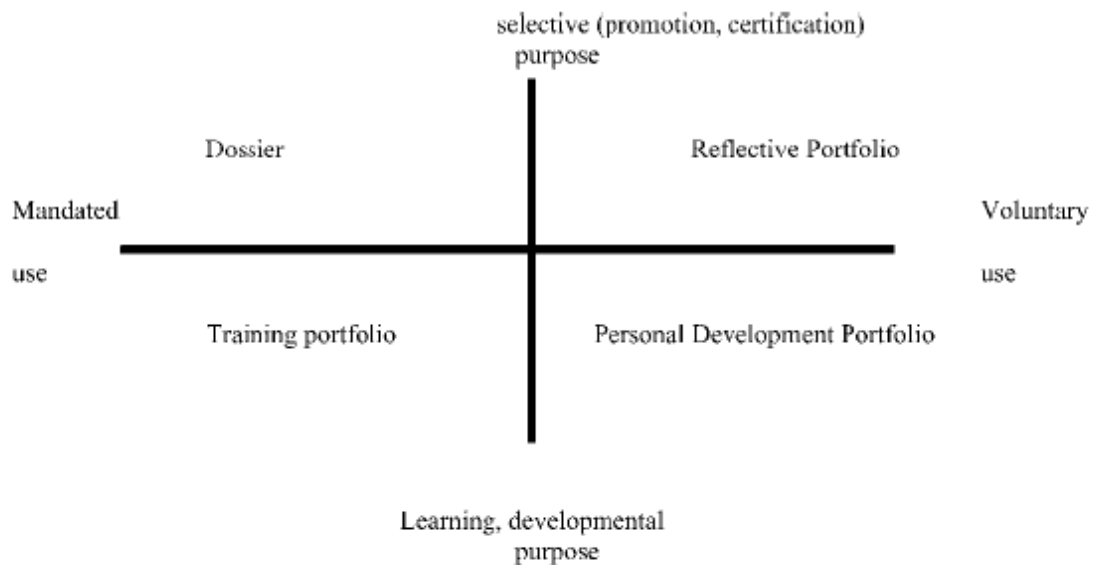
Figure 1 Different Types of Portfolio
(Smith & Tillema, 2003, p. 629)

Portfolios thus have a range of designs for their intentions, purposes and implementations. Intentions include both formative and summative uses and combinations thereof. Purposes range from personal learning to public display, and implementation can emphasise either, or a combination of, learning competencies for personal development and lifelong learning, or the display of professional knowledge and competencies for entry into practice. However, it is important to note that tensions and contradictions may arise when portfolios are used for multiple purposes. This will be considered next.

Tensions in multipurpose portfolios

When assessment tools, including portfolios, are inadvertently used for both learning and assessment, these fundamentally incompatible ends may cause unavoidable tensions to arise. As discussed in the introduction, in the section 'Assessment dilemmas in higher education', the nature of high stakes assessment dictates that students put forward only their best achievements for the highest possible grades, given these outcomes are gateways to future studies or employment. The portfolio functioning as evidence of achievement 'should be expected to contain a sample of … best

work, unless we suppose that [the student] can be persuaded to indict him or herself' (Meeus et al., 2009, p. 402). Typically though, grades provide students and others with insufficient information regarding the rationale behind the mark (Yorke, 2010). In particular, the marking of summative assessments, even with rubrics, rarely provides information on *why* criteria were not met, or suggests how students might identify gaps in their understanding or work to fill those gaps (Gikandi et al, 2011, p. 2339). There is thus the potential to fall into the trap of a summative end, creating the learning behaviour that recent developments in assessment have sought to overcome. Therefore, while it may be desirable to include draft work in the portfolio for feedback so it may be improved, this is incompatible with summative assessment. FitzPatrick et al. (2010) provide a poignant example of the tensions in using a portfolio for both critical self-reflection and demonstrating achievement. The students in their study expressed strong feelings of misuse, bewilderment and anger over the uncertainty generated by the multiple purposes of a portfolio involving deep personal reflection (p 173). The authors recommend providing private portfolio spaces where difficult challenges can be worked through without premature exposure to others.

Agreeing that there is little doubt of such tensions, Wiliam (2000) nonetheless demands 'we must refuse to accept the incompatibility of "summative" and "formative" assessment. Instead, we must find ways of mitigating that tension, by whatever means we can' (p. 15). He argues there are three key steps to consider in alleviating the conflict: the elicitation of evidence, its interpretation, and the action taken as a result of it. Elicitation, firstly, is an assessment activity designed to provide evidence of the student's capabilities in a particular area. Wiliam gives the example of student teachers on placement, visited by their tutor for evaluation of their teaching competence. The tutor's intent is to help by asking the student about any difficulties they are experiencing, but the students keep their difficulties hidden, believing this may negatively influence the tutor's

marking of their abilities (p. 17). Wiliam identifies two ways of alleviating this tension. The first is to assess a broad evidence base to increase reliability and reduce bias. The second is to shift the focus of the assessment from the actual performance to the quality of self-evaluation. Thus in the example, the tutor would instead discuss the results of the student's own self-evaluation (p. 19).

Interpretation of the evidence is the next crucial step. Insisting that the essential condition for an assessment to function formatively is that it must provide evidence of what needs to be done next to close the gap in learning, Wiliam (2000) insists the interpretation must include information to the student about ways they might close the gap next time, and mechanisms to ensure there is a next time and that the gap is actually closed. The final step is the action taken as a result of the evidence. As discussed, actions can lead to high stakes outcomes so their significance is paramount. Wiliam's approach can be summarised with his advice that the tensions may be 'ameliorated by separating the elicitation of evidence from its interpretation, and to interpret evidence differently for different purposes.' (p. 21).

Fortunately, the increasingly sophisticated electronic portfolio (e-portfolio) platforms available increasingly support adapting material to different ends and add clarity to the various purposes. Easy storage and retrieval of learning artefacts allow students the flexibility of keeping a large repository of their work, manipulating it and revealing it selectively for any desired purpose. In addition, e-portfolios allow both students and staff to track feedback and progress. Barrett's (2011) extensive work in this area provides an example of the one platform being used for multiple functions: collecting and storing, working with and processing, and displaying evidence. Using this platform, artefacts are stored, created and moved for different purposes, and the student has control over who may access what. However, it must be transparent to both students and staff which mechanism is in place at any given time, as discussed.

Portfolios for Formative Functions

Student engagement and feedback practices are two areas that particularly provide opportunity to usefully redirect the focus of portfolios towards learning.

Student engagement

In the university sector, attention to the issue of student engagement has become ubiquitous (Baron & Corbin, 2012), and portfolios can be very useful in this regard. The engaged student is one who has a positive and work-related state of mind, 'characterised by vigour, dedication and absorption and who views him or herself as belonging to, and an active participant in, his or her learning communities' (Baron & Corbin, 2012, p. 763). Wimpenny and Savin-Baden (2012) show students find themselves engaged through relationships built within their educational environment, through gaining autonomy in learning, and by being resilient (p. 316).

Engagement is critical, not just for academic achievement but also for fostering students' experience of belonging in higher education and becoming part of their chosen profession (Baron & Corbin, 2012). With suitably designed guidelines, portfolios are a medium through which students can continuously engage, rather than waiting for the next assignment to be due (Barrett, 2007). They can add examples and experiences of new things learnt and record and reflect on moments when they can see direct connections with their future practice. Tiwari and Tang (2003) provide such an example in their (albeit limited) interviews of nursing students, who reported favouring the use of portfolio assessment and said they would choose it again even though it meant extra work (p. 273). The authors were surprised by an incidental finding that it fostered peer interaction: 'over 80% of the students were involved in some form of collaborative learning groups while preparing for the portfolios' (p. 275).

Thus, there is some evidence that portfolios can enhance students' engagement in their programs provided they are designed to capture, hold and encourage students' attention.

Feedback

The Formative Assessment section above discussed that this type of assessment implies that students will receive feedback on the gaps in their learning and how to address them. It concluded with the idea that feedback is a complex system that needs to permeate the curriculum (Boud & Molloy, 2013, p 25). Portfolios can act as a central component in managing this 'complex system'. Their ongoing nature can facilitate feedback monitoring and communication between students and tutors (Buckley et al, 2009, p. 291). They are particularly useful if well designed, require continuous engagement and are supported in a digital environment (Altahari et al, 2012). For example, feedback can be collated, as can the actions taken as a result, and their success or need for further intervention. For both teachers and students, ready access to prior feedback comments (their own, and those of others) is enabled, without having to wade through a morass of material (Barrett, 2007). Monitoring of feedback also has potential to assist in facilitating different understandings of feedback from staff and student perspectives (e.g., Adcroft, 2011; Taylor & Burke da Silva, 2013).

Portfolio tasks may also be designed to encourage students' efforts to elicit their own feedback (from peers, group-work and self-assessment from previous episodes) and thus assist their progress in managing their own learning. Duque et al. (2006) found their e-portfolio 'encourages student self-reflection, tracks student progress in skill acquisition and stimulates student-tutor interaction with a high level of acceptance' (p. 7). Situating student self-management as central to feedback, Carless, Salter, Yang, and Lam (2011) found 'multistage' assignments such as portfolios '… facilitate sustainable feedback when … processes support students in self-monitoring their work while it is being developed' (p. 398). Arguing that the

relationship between teacher and student in assessment by the portfolio route is an improvement on traditional assessments, Klenowski, Askew, and Carnell (2006) considered feedback in this case as a 'dialogue' in which both parties are learners, rather than as a 'gift' from teachers (p. 281). Portfolios can thus facilitate dialogic feedback, positioning students as active participants in the management of feedback and allowing both students and teachers greater opportunity to close the feedback loop. Klenowski et al. (2006) further contend that, because portfolio use is congruent with particular beliefs about effective learning, 'it cannot be an "add-on" to a course but must be at its very core' (p. 284).

Few other tasks ask the student to work with feedback in such an integrated manner over time. A good example of empirical research in this area is by Fung, Walker and Fung et al. (2000), who reported excellent outcomes in a multi-centred trial of attitudes of medical residents towards self-managed learning using a portfolio. The residents reported increased awareness of their learning, were more inclined to learn on their own, had a positive attitude toward life-long learning and expressed strong interest in taking on new learning. Moreover, they felt didactic lectures would no longer be sufficient to support their future learning. Designing a task for which students must use the resources in their portfolio and asking them to reflect on previous work can provide students with insights into their own learning that they can carry into their future.

Portfolios for Longer-term Learning

Consideration must be given in designing assessments in higher professional education to their effect on student behaviour and learning, as argued in the 'Changing Assessment in Higher Education' section above. That section put forward that assessments should help students to help themselves, include learning skills shown to last, and engage students with feedback and reflection. Moreover, it was argued, there should be a focus on

fostering students' learning into the longer-term, as students embark on early professional practice. Portfolios, although diverse, have a long history of use as formative tools for development and learning (Baume and Yorke, 2002). However, in response to recent trends in assessment policy, such as the movement towards standards based assessment, the trend has been to utilise them to display end products or 'best' work (e.g. Groom & Maunonen-Eskelinen, 2006). In the current setting of declining resources in higher education, portfolios must be used for both formative and summative ends, and provided the tensions are recognised and managed well, as discussed in the 'Tensions in multiuse portfolio' section above, they lend themselves to do this. They are also suitable as a vehicle for developing learning skills shown to foster lasting learning, or what Meeus et al. (2006) call 'learning competencies', which they believe add genuine value 'if we want our graduates to be capable of continuing to learn on a life-long basis' (p. 127).

Rationale for an empirical study on portfolios for longer-term learning

The rationale for the research study conducted in this thesis stemmed from a desire to foster longer-term learning in the students of a professional health science program. The researcher and colleagues in a large metropolitan university in Sydney, Australia, responsible for a postgraduate program for students learning the medical imaging modality of ultrasound in order to enter the profession of sonography, became increasingly aware of the need to go beyond teaching to entry-level competencies. Sonographers are health professionals who play a crucial role in the diagnosis and treatment regimes of patients within the healthcare system through the interpretation of the images they produce using ultrasound equipment. Rapidly changing technologies, shifts in the health care environment and professional requirements shaped the need to engender continuing learning so that new graduates could and would tackle the new challenges thrown at them, particularly in the first crucial years of entry to the profession. This required the course team to re-evaluate the program's pedagogical strategies and find where longer-term

learning skills might fruitfully be incorporated into portfolio assessment. Research was then conducted on the impact of the resulting interventions during the course and into the longer term.

The program had an existing, if somewhat minimalistic, portfolio that was generally considered by the staff and students as a useful assessment task. Its particulars, along with the details of the research methodology which will be covered in Chapter 3, made it suitable for the inclusion of learning skills. A research project was envisaged involving participants volunteering from the student group to answer some important research questions, as described next in chapter 3.

Chapter 3 Methodology

Introduction

Having discussed, in chapter 2, the pressing need for assessment practices in higher education to build capacity for students to continue to learn in the longer term, this chapter addresses the question of how pedagogical interventions in portfolios might help, by developing a research strategy for the empirical study employed for this thesis.

The chapter begins by arguing for the theoretical framework within which the study is located, outlining an overarching interpretive approach. The view that learning is a social practice that occurs through engagement in 'practices' is developed through the research framework of practice theories. This view contrasts with traditional theories of learning. Within this approach and framework, an educational design research method promises a fruitful way forward.

After establishing the approach and framework, the context of the study and the educational and professional settings in which it is conducted, the research participants are outlined and discussed, cumulating in a justification of each of the data collection devices employed (that of focus groups, interviews and portfolio entries). Finally, the research schedule for the empirical work is set out, ethical considerations are discussed and a reflexive statement is provided, facilitating the launch of the empirical investigation.

In envisaging a research project that contributes to understandings of ongoing professional learning through portfolio assessment, the major consideration will be the complex social settings of which university programs are composed, leading to professional practice and its workplaces. Institutional imperatives, entrenched practices, learning environments and

human behaviours constitute the intricate backdrop to this study and influence the approaches to data collection and analysis outlined.

Theoretical Framework

The first section of this chapter justifies the use of an interpretive tradition as a suitable underpinning for the theoretical stance taken in this thesis, and proposes practice theories as an appropriate framework for the interpretation of findings. It also identifies an educational design research approach as fruitful for the collection of data in the context of the study. Educational design research invokes iterative cycles, which are a feature of the thesis. This section discusses how the analysis is built through a particular framework that provides a systematic means to investigate the research questions, utilising four phases of investigation.

While a multitude of well-established methodological traditions are available to the educational researcher, as numerous texts on education research, many with multiple editions, will attest (e.g., Cohen, Manion, & Morrison, 2007; Wiersma & Jurs, 2009), much educational research concerned with social interactions in intricate environments follows an interpretive paradigm. The central endeavour of the interpretive tradition 'is to understand the subjective world of human experience' (Cohen, Manion, & Morrison, 2007, p. 21). It is often contrasted with the empirico-analytic paradigm in which knowledge is seen as the discovery of universal truths, and the critical paradigm, in which knowledge is personally developmental and acquired through critical debate (Higgs & Llewellyn, 1998, p. 61). Usher (1996) discusses the interpretive epistemology as an 'influential perspective' (p. 18), the key assumption of which is that researchers are humans ensconced in the social world and must acknowledge their place within. This is appealing for this project because the information sought can only be gained by eliciting meaning through the particular experiences of the study's participants with specific educational interventions in a certain

authentic context. The interpretivist perspective acknowledges that findings will be deeply invested in the elucidation of participants' meanings, which is central to this thesis.

Interpretivists also place great importance on the nature of language in the social world, and understand that words and gestures are given meaning because they are embedded in social interactions. Linguistic practices, embodied as they are in discourses and texts, govern what can be known and communicated. The central position of discourse means that the role of the researcher is to produce knowledge, rather than to find it. In the work of interpretivists, human action is given meaning by interpretation or frameworks, which are interpreted by researchers, the so-called 'double hermeneutic'. As Trede and Loftus (2010) argue, 'Interpretations are always made through the filter of previous knowing and language, and rather than asking whether an interpretation corresponds with reality it is better to ask whether an interpretation is coherent and useful' (p. 187). In any investigation of portfolio assessment in an institution such as a university, aiming to prepare students for professional practice in complex environments, and involving a myriad of interactions among institutions, students, teachers and workplaces, such an approach must be considered a good fit. Dolmans and Tigelaar (2012), in a study of portfolios in teacher education, similarly concluded that 'hermeneutic, interpretative research … would be the most appropriate … for building design guidelines for portfolio assessment processes' (p. 4).

A major advantage of an interpretive approach for this thesis is that it rests on the foundation of established method and theory in educational research. It gains acceptance from its use of recognised methods, such as those employed in this thesis, which require interpretation of communications with participants. A further advantage is that the empirical material can be analysed with the help of available data manipulation software. Moreover, within this research tradition, this study required an approach suited to

dealing with people in the complex social context of higher education research, with participants who might benefit from a design involving interventions aimed at learning skills and longer-term learning. Considering this emphasis on learning, it is important to look at the underlying assumptions about the nature of learning.

Learning through social practices

The underpinning assumption about learning presented in this thesis is that it occurs through social interaction, and that knowledge is built through social, cultural and embodied practices. This contrasts with traditional views in which knowledge and learning are mainly processes of the minds of individuals. This section will use the commonalities of practice theories as a starting point, to present suppositions about a view of learning through practices.

Practice theories

Views on the way that learning occurs in organisations, educational institutions including universities, and workplaces are undergoing significant change, primarily in response to the rise of work around theories of 'practice' as the basic form of social arrangement. Practice theorists contend social order is constituted by a set of actions called practices. Schatzki, Knorr-Cetina and Savigny (2001), for example, argued that the emergence of practice theory is a 'potent challenger' (p. 2) to established ways of thinking about social life. In their edited volume titled *The Practice Turn in Contemporary Theory*, these authors work from a number of social theorists' standpoints to argue that practices – that is, 'arrangements of people, artifacts, and things' (Schatzki, 2001, p. 15) – are the basic social 'thing', and that knowledge and learning occur through action and interaction within these practices. In his chapter 'Practice Mind-ed Orders', Schatzki (2001) defines practices as 'organised nexuses of activity' (p. 56) and 'a set of doings and sayings organized by a pool of understandings, a set of rules, and a teleoaffective structure' (p. 58). 'Doings and sayings' are

behaviours people perform directly with their body, such as in the example of building a fence, which may be part of farming practices (p. 59). Sets of rules govern people's understandings of such practices, and likewise, 'practices harbor collections of rules that practitioners … are expected to observe' (p. 60). Teleoaffective structure is what makes sense to a person to do. Schatzki (2001) calls this 'practical intelligibility' (p. 55); that is, a range of acceptable or correct ends, tasks to meet these ends, or beliefs or emotions to meet these ends (pp. 60, 61).

Attributing this book with giving practice theories renewed vigour, Gherardi (2006) nonetheless cautions that while it generated new credence to theories of practice, it joined a number of other theoretical positions in a similar vein without producing a unified theory. She contends it was '… yet another "turn" after the cultural, linguistic and narrative ones' (p. 37), and posits instead that there are a number of 'practice theories' with commonalities. Shatzki (2012) subsequently concurred with this view, summing up with the observation that:

> the domain of 'practice theory' is delimited by a conception of
> practices as organized activities, the conviction that both social
> phenomena and key 'psychological' features of human life are tied
> to practices, and the idea that the basis of human activity is
> nonpropositional bodily abilities (p. 14).

The practice approach can be understood then as analyses that develop an account of practices, or study the nature and transformation of their subject matter through their practices. The idea that all social activity, including knowing and learning, is embedded in practices not only contrasts with many traditional conceptualisations of learning (and teaching), but also provides a much broader account than any of the learning theories alone. Theories of learning have been the focus of much attention over the last few decades. The following section explains the major differences between these theories, as a background to justifying the use of using a practice framework

to study learning in this thesis.

Learning theories

A critical overview of three theories of learning (cognitive, sociocultural and post-Cartesian) from a higher education perspective, provided by Hager, Lee and Reich (2012), helps by providing contrast with new notions of learning through a practice perspective. Firstly, there are theories based primarily on the individual learner who processes information cognitively and, on reflection, stores knowledge in the mind to be applied in practice. Learning 'is treated as a "thing" that can be "acquired" and "transferred" by learners. The significant role of the social, cultural and organizational factors in learning is underestimated' (p. 6) by this idea. Learning has also been likened to the notion of ' banking education' (Zeeman & Lotriet, 2012, p. 181 following Friere) whereby deposits of knowledge are made into the minds of students to be applied in context as the opportunity arises.

In sociocultural theories of learning, the individual learner and his or her mind is no longer the main site of learning, and the idea of learning as banking deposits is rejected. The emphasis is instead on learning in social environments, or as 'an ongoing process of participation in suitable activities' (Hager et al., 2012, p. 7). These accounts see learning as inextricably entwined in the context of the learner, shaped by the social, organisational or cultural norms of their environment and occurring in practices.

The third account of professional learning covers a multitude of theoretical discussions and is argued by Hager et al. (2012) to be the 'post-Cartesian' theories. These include Foucault's theories, psychoanalytic and cultural studies, theories of pedagogy and learning as desire and struggle (p. 2). Also included in this category are the more recent sociomaterial approaches, such as actor-network theory and complexity, which emphasise that the spatio-temporal factors that constitute learning are inextricable from practice and

change. Saying these accounts emphasise the unpredictability of learning in practices, they believe that 'learning is not fully decidable in advance' (p. 6). Importantly, these ideas argue that 'theoretical knowledge becomes something that a novice practitioner requires, to prepare them to embark on learning a practice through practice' (p. 7).

In considering learning for professions and professional learning then, Hager, Lee and Reich (2012) argue for a practice approach and propose five conceptions of theorising practice:

1. That practice is more than simple application of theoretical knowledge, 'or a simple product of learning … (which) … sees knowledge as more than something possessed in the mind or a "thing" to be transmitted.' It comprises everyday doings, sayings, routines, arrangements and contexts and the forms of knowing that result.

2. That practice can be seen in a Schatzkian light as a sociomaterial phenomenon, involving human and non-human objects, such as technology and spaces.

3. That practice involves bodily sayings and doings and consists of relations among people and the material world. They note '...contemporary theorisations of professional practice, in particular, are at pains to emphasise relational complexity through concepts such as ecology, network, choreography and orchestration' (p. 4).

4. That practices exist and evolve in 'historical and social contexts—times, places and circumstances—and they take shape at the intersection of complex social forces, including the operations of power. Particular regimes of practice govern the way we work, practice and learn' (p. 4).

5. That practices change and evolve in time and space, and are not able to be specified in advance, thus having an emergent character (p. 5).

Hager et al. (2012) state that this set of principles does not attempt to represent an exhaustive theoretical account of the characteristics of practice. This contrasts with, for example, Kemmis' (2009) studies of professional

practice in which the author '… lays out no fewer than 14 characteristics that he argues are distinctive to social practices' (pp. 23, 24)' (cited in Hager et al., 2012, p. 5). Each of these creates a resource for closer examination of their applicability to understandings of professional practice. The practitioner, then, is an embodied subject, produced through participation in practices that shape skills, knowledge, understanding and disposition to action. The importance of participatory learning is recognised in much of the current emphasis in professional education on clinical placements, work-integrated learning, internships, fieldwork and so on, and curricular strategies such as problem-based learning and inquiry-based learning.

Pertinent to this thesis, which investigates how to prepare people to enter professional practices, Schatzki (2012) notes that:

> the world according to practice theory offers much to investigate. There are practices, arrangements, activities, bundles and constellations. There are questions about which of these exist when and where, their details, how they work and unfold, how they can be designed or altered, and *how to prepare people to enter them* (p. 23, italics added).

Schatzki also explains that '… understanding these things [practices] is essential to understanding the subjects' lives and worlds and is essential to 'anticipating and attempting to shape their future' (2012, p. 24). He argues that to investigate practices, the only choice is to 'practice interaction-observation' (p. 24). He holds: 'There is no alternative to hanging out with, joining in with, talking to and watching, and getting together with the people concerned' (p. 25). He argues that teaching practices are particularly complex, saying:

> Teaching practices, for example, maintain particularly thick causal relations with the students, markers, essays, computers, and blogs on which the people carrying them out immediately act as thinner causal relations with other university arrangements,

for instance, those composing central administration or the
athletics department (2012,

p. 17).

Having argued in the 'interpretive' section above that discourse ideas will be
important to this thesis, it is interesting that Schatzki (2002) specifically
contrasts Laclau and Mouffe's work *Hegemony and Socialist Strategy* (1985)
and Charles Taylor's *Interpretation and the Sciences of Man* (1985), from a
discourse viewpoint. He argues that the former presents a discourse as
something 'highly similar' to the social order ideas of the latter and casts
discourse as a necessary function of practice, saying, 'Discourse … is being,
while practice is the becoming from which discourses result and to which
they eventually succumb. Conversely, discourses are the precarious fixities
that precipitate from human practice and from which further practice arises'
(Schatzki, 2001, p. 53).

Thus discourses, such as those collected and interpreted through research
activities like interviews, focus groups and portfolio texts, can also be
considered from a practice perspective. The interrelatedness of practice and
discourse supports the validity of using discourse in research data to
generate understandings for this thesis, of longer-term learning.

Examples of the application of practice theories to learning are starting to
emerge in research into higher education for professional practice (e.g.,
Higgs et al., 2010; Hager, Lee, & Reich, 2012; Higgs et al., 2013), supporting
the choice of this approach in this thesis. This choice is explained whilst
being mindful of Trowler's 'wicked issues' (2012, p. 273) in the relationship
between theory and data. Wicked issues are problems that are unique, ill
defined and complex, and which involve 'close-up' data, such as this thesis
presents. Close-up research is seen as particularly problematic from the
perspective of the theory-data relationship, as 'close-up researchers are
often insiders … and so are themselves liable to being influenced by tacit

theories held by respondents' (p. 276). Trowler sees research in the setting of higher education for the professions as complicated and problematic, noting that individual judgment is often required on the application of theoretical standpoints. He says, 'the multiplicity and complexity of both the circumstances of education and the frames of reference professionals bring to bear on them means in most cases …(there is) … no substitute for the exercise of judgement …' (Trowler, 2012, p. 274).

The foundation from which the methodology for this thesis is considered is thus formulated by judgments from the researchers' experience and the nature of the context. It most suits consideration from an interpretive paradigm with an emphasis on learning as a social phenomenon that can be fruitfully viewed through the lens of 'practice theories'. Having established these underpinnings, approaches for designing the research plan can now be considered.

Methods such as action research and ethnography are suitable for the data that will be generated for this thesis; however, educational design research stands out for this study. This method not only formatively evaluates interventions, it also aims to test or refine theories in learning environments. As Dolmans and Tigelaar (2012) explain:

> although these approaches [ethnography and action research] might have a lot in common, such as the iterative and cyclic process of design, evaluation, and redesign … the refinement and testing of theories [in educational design research] is intertwined with designing and improving the learning environment (p. 2).

Thus educational design research offered a solution to researching participants' experiences with portfolio interventions over time, incorporating their feedback into the design of subsequent iterations of the task, and generating theoretical understandings at each step. An explanation follows.

Educational Design Research

Educational design research meets the needs of educational research to address theoretical questions about learning in context; that is, to study learning phenomena in the real world (Collins, Joseph, & Bielaczyc, 2004, p. 16). It conceptualises that in the attempt to create something that works, practitioners design a task based on theory, which is then implemented, usually iteratively, with findings feeding back into theories of learning. This is particularly useful for this study, which has been designed by a practitioner (the researcher), to implement learning designs in portfolio assessments to investigate participants' interactions, to inform subsequent redesign. The particularly important role of participant's feedback in this process is also supported by educational design research; as MacDonald (2008) states, 'the participants' feedback is particularly valued' (p. 433).

While very popular in school-based research, good examples of educational design research exist in higher education both internationally (e.g., Dolmans & Tigelaar, 2012) and nationally. Schuck et al. (2012), for example, chose educational design research to investigate mobile learning technologies, 'because the intervention was to be tested and modified, in an authentic setting [in] higher education at an Australian university' (p. 5). Supporters of educational design research argue it is:

> based strongly on prior research and theory and carried out in educational settings, (it) seeks to trace the evolution of learning in complex, messy (environments), test and build theories of teaching and learning, and produce instructional tools that survive the challenges of everyday practice (Shavelson et al., 2003, p. 25).

Educational design research's background stems from its consolidation in the literature; in 2003 and 2004, special issues of *Educational Researcher*, *The Journal of the Learning Sciences* and *Educational Psychologist* were

devoted to the theory and practice of what was then termed 'design-based educational research'. The method has since had a variety of related labels and many have adopted it in their research (e.g., Hakkarainen, 2009, in problem based learning; Kali, Levin-Peled, & Dori, 2009, in collaborative learning). The theoretical underpinnings of educational design research have also grown steadily to the point that textbooks are dedicated to it (e.g., Kelly, Lesh, & Baek, 2008; McKenney & Reeves, 2012), its methodological approaches have been examined (e.g., Markauskaite, Freebody, & Irwin, 2010; Eri, 2013) and it has been subject to ongoing epistemological considerations (e.g., Akkerman, Bronkhorst, & Zitter, 2013). Kelly, Lesh and Baek (2008) comment that in 'comparing its commitments to those of more traditional approaches, design researchers foreground the fluid and dynamic, the '…environment-responsive, future-oriented and solution-focused nature of design' (p. 5).

One of the critiques of educational design research is the perceived problem that results are often 'narratives' (Shavelson et al., 2003, p. 27). Shavelson et al. (2003) raise concerns about the nature of narrativist knowledge claims, and ask on what grounds the narrative could be seen to correspond to what actually transpired (p. 27). A counter argument is presented from a post-positivist perspective, which holds that the story is still powerful, and it holds more plausibility in this mode than it would if it were verifiable. The authors point out that the argument for the validity of design research narratives centres on the reasonableness of the argument; that practitioners and researchers are able to recognise and understand the explanatory framework of the narrative, based on the 'script and scene schema' (p. 27). They then acknowledge that the research method should be driven by the research questions.

Building on these early concerns, a recent case study by Akkerman, Bronkhorst and Zitter (2013) investigated the complexity of educational design research, emphasising the importance of viewing design research as

a complex interaction rather than a linear one. Arguing that design research 'necessitates balancing three different … epistemic practices: (1) educational research, (2) educational design, and (3) educational change' (p. 421), these authors present an analysis of the challenges facing researchers using this tool, and envisaging it this way helpfully disentangles the research process and the difficulty of dealing with different, easily conflicting research positions. It is argued that good design research has five characteristics:

1. The central goals of designing learning environments and developing theories of learning are intertwined.

2. Development and research take place through continuous cycles of design, enactment, analysis and redesign.

3. Research on designs must lead to sharable theories that help communicate relevant implications to practitioners and other educational designers.

4. Research must account for how designs function in authentic settings. It must not only document success and failure, but also focus on interactions that refine our understanding of the learning issues involved.

5. The development of such accounts relies on methods that can document and connect processes of enactment to outcomes of interest. (Design-Based Research Collective, 2003, p. 5).

Claims of this nature encompass the aims of this research, conducted as it is in the complex milieu of a university course, with its multiple conflicting characteristics and internal and external influences. In particular, point 2 emphasises continuous cycles, or iterations. Iterations are important in this study and the significance of iteration in educational research is discussed below.

Iterations

An iterative approach to research refers to a systematic and cyclical

approach to data collection. Bassett (2010) sees iteration as an 'interplay between elements of the research, such as that between design and discovery, or among data collection, preliminary analysis, and further data collection …' (p. 504). Drawing from this idea, this thesis presents three major iterations between the design of a portfolio, and the discovery of findings from participant interactions with the design, which then feed into the redesign efforts. Bassett (2010) further points out that iterative approaches have been criticised for changing the study objectives and thus lacking rigour; however, he argues this criticism is misguided (p. 504); rather, the approach allows the necessary flexibility to respond to the needs of the study. Minor iterations also occurred in this thesis between data collection from focus groups and its preliminary analysis, and subsequent, refined, data collection from interviews and portfolios, as will be explained. Some see iterative data analysis 'not as a repetitive mechanical task but as a reflexive process … key to sparking insight…' (Srivastava & Hopwood, 2009, p. 76).

Each iteration, while employing the overall perspective of educational design research, adapts in particular the framework proposed by Bannan-Ritland (2003) and Bannan-Ritland and Baek (2008), which provides useful parameters for analysing complex learning environments. This provides a systematic means to investigate the research questions around this assessment tool. The four phases of the model are as follows:

1.   Informed exploration phase
This first phase consists of identifying and describing the state of the phenomenon, generating initial theoretical perspectives about how people learn and perform, and identifying the corresponding design directions to take (Bannan-Ritland & Baek, 2008, p. 301). Applying this phase as it pertains to this thesis involves identifying and describing the existing portfolio and generating initial theoretical perspectives from participants' perspectives of their learning from the portfolio. This is explored in the first

iteration (see chapter 4), which allows decisions to be made on the redesign features for the next iteration.

2.   Enactment

Distinguishing interventions as socially constructed objects requiring systematic articulation and revision over a number of cycles, this phase comprises design, articulation and subsequent detailed redevelopment (Bannan-Ritland, 2003, p. 23). Chapter 5 discusses this phase, in which three interventions are implemented and researched through themes identified by the participants, evaluated by the teaching team and redesigned in the third iteration phase (see chapter 6). Chapter 6 also invokes this phase, implementing two further interventions and similarly researching identified themes to suggest redesigns.

3.   Evaluation: Local Impact

In this phase, the theoretical understandings in the particular cohort being investigated (local impact) are evaluated. For each iteration, following the description of the task and discussion of the themes raised by the participants, a section is devoted to discussing local impact.

4.   Evaluation: Broader Impact

This phase provides the opportunity to engage with the broader theoretical constructs raised in the themes. In particular, the findings from the themes generated by participants are related back to the literature, which provides a background understanding for the researcher and teaching team, and allows for further exploration as to what the themes identify as necessary for the redesign efforts. For each iteration following from the section on local impact, a section is devoted to discussing the broader impact. The specific iterations for the research design are further developed in the 'Iterative Design' section below.

Data sources in design-based research are typically complex. Data-

gathering techniques include interviews, videotaping, journal entries and pre- and post- surveys (Bannan-Ritland, 2003). This type of data suits the investigation of student learning encounters, which in the empirical work of this thesis include interviews, focus groups and portfolio texts.

Due to its suitability for making sense of complex social settings, the interpretive paradigm is essential for investigating the general problem of equipping students for longer-term learning during their encounter with university studies. Underpinned by this paradigm, learning can be viewed as a social process through the lens of practice theories, and the educational design research approach stands out for its ability to provide insights into educational innovations while developing some broader theoretical perspectives to enhance current and future practice. The next section discusses the context, recruitment and data collection for the research.

Educational Setting

The setting for this study is a health professional education course at a large metropolitan university in Australia. The course is a two-year, part-time, postgraduate course in medical ultrasound at graduate diploma level. It sits in a large faculty of health sciences which encompasses a variety of professional health science programs of all levels, including undergraduate bachelor's degrees, graduate entry and specialist masters coursework degrees, and higher research degrees, with disciplines such as physiotherapy, speech pathology, exercise and sport science, etc. It is located within a discipline of medical radiation sciences, whose courses encompass the professions of diagnostic radiography, nuclear medicine, radiation therapy and medical sonography. Students in three subsequent cohorts of this program were asked to volunteer for research into the portfolio assessment task.

The attendance pattern for the sonography program is part-time distance

learning, with students visiting the campus for short periods of intensive teaching sessions termed 'blocks'. As is fairly typical of distance programs, students are provided with extensive distance learning materials for each unit of study, which cover the weekly readings and learning activities, augmented during each block by an intensive timetable of lectures, tutorials, interactive sessions and formative and summative assessments. The typical block attendance is one-week full time, with one block held at the commencement of the program, and then one each semester.

The program included, at the commencement of the research, an existing portfolio task (the target of the investigation) that had been a part of the program for a number of years. It was introduced in the first block and continued throughout the course, with a formative assessment in the first semester and subsequent summative assessments at points throughout the remaining semesters. The part-time nature of the program and the participants' concurrent clinical placement provided students with excellent access to authentic cases of practice to include in their portfolios. This also allowed for conducting focus groups during the on-campus attendance, as well as interviews and research into the portfolios texts (see the Data Collection section below). Such programs in Australia require accreditation by the Australian Sonographer Accreditation Registry (ASAR), in order that their graduating students can practice as an Accredited Medical Sonographer (AMS).

Professional Setting

Sonographers are health care professionals who provide an essential function in the diagnosis and treatment of patients within the healthcare system. They have a critical role in the interpretation of the images they produce using ultrasound equipment, due to the real-time nature of ultrasound examinations. Performing an ultrasound requires the sonographer to interpret the real time imaging they produce during the examination, and make a diagnosis (or form one or more working

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provisional diagnoses) to create and capture the images that demonstrate whether the diagnosis is present or absent, and if present, it's extent and features for staging. This high level of responsibility is recognised by professional bodies. For example, the AIR Code of Practice (2007) states: 'Because of the operator-dependent, interactive and dynamic characteristics of the diagnostic ultrasound examination, sonographers are delegated considerable decisional latitude in usual clinical practice'. Further, Merritt (2000) found that 'even today sonography remains the most technically demanding … of all imaging methods' (p. 1201), while Finberg (2004) explained:

> The one major difference between ultrasound and other imaging
> disciplines …. 'For radiology studies, the exam is easy, and the
> reading is difficult. For ultrasound, the exam is difficult, and the
> reading is easy.' In most radiologic examinations, the image
> acquisition is done by prescribed protocols, straightforward and
> 'easy'. The analysis of the obtained images and their
> interpretation is the challenge. In sonography, the image
> acquisition is complex and operator dependent, and it becomes the
> diagnostic process …. Thus, in large measure, the one who holds
> the transducer makes the diagnosis (pp. 1543-1544).

High levels of qualification, training, experience and professionalism are thus needed for professional practice as a sonographer. The aim of the program under investigation is to develop these to professional entry-level standard, through curricular structures, teaching and learning opportunities and assessment strategies. Students are assessed comprehensively throughout the course, and for professional entry level through the clinical assessments in the program. Further information regarding the research participants, drawn from this student group, is provided below.

As the program was conducted over two years, three full iterations of the

research into the portfolio were possible. This would not have been the case for a longer program. Iterations are a necessary feature of the educational design research approach as was introduced earlier. The first iteration involved an evaluation of the existing portfolio task. This was followed by two further iterations as the portfolio was redesigned to include the five pedagogical interventions deemed potentially the most fruitful (see chapter 2). The three iterations are outlined in the next section.

Iterative Design

Given the educational and professional settings outlined, the research is able to draw three iterations of the portfolio task, allowing the inclusion of five longer-term learning interventions. These iterations are termed the first, second and third iterations, as discussed.

1.   First Iteration

The first iteration involved research into participants' experiences of the existing portfolio assessment task. For over 10 years, students of this medical ultrasound program, seemingly unproblematically and with minimal instruction, have been undertaking a portfolio task that asks them to collect and compile a discussion of one case of interest per week and research its significance. In the first iteration the researcher worked with the research participants towards identifying those features of the task that did or did not work well, to retain those that were working, and find improvements for those that were not. The existing task was then redesigned prior to the second iteration.

2.   Second Iteration

The second iteration added three interventions to the redesigned portfolio. These interventions are portfolio tasks that ask participants to engage in independent learning, provide a reflection on previous work, and examine an instance in which they reached a clinical judgment. Participants'

responses were collected on each intervention and the portfolio was redesigned according to the findings.

3. Third Iteration

The third iteration added a further two pedagogical interventions, one asking participants to engage in self-assessment and one asking them to demonstrate competence.

The sequence of research iteration and portfolio redesign is depicted in Figure 2.
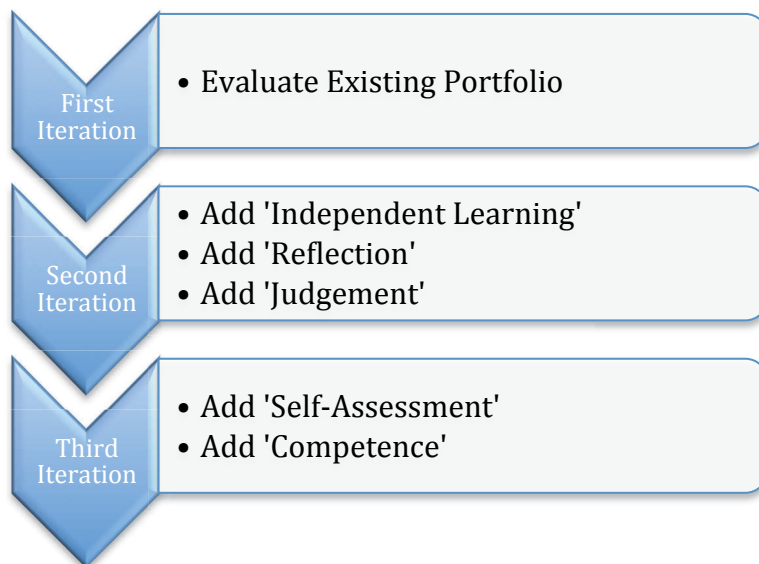
Figure 2 Research Iteration and Portfolio Redesign Sequence

Having outlined the iterative nature of the research and the way it relates to the research setting, the mechanics of the research investigation are explained further in the Data Collection section below. However, first, it is necessary to describe the research participants and the method by which they were categorised for the purposes of this study.

The Research Participants

The research participants were volunteers drawn from three student cohorts of a postgraduate health science course in medical sonography in Australia, as mentioned in the Professional Setting section above. Australian sonographers are health professionals who complete an accredited two-year professional entry qualification in medical sonography, entry to which requires an undergraduate degree in health science. They have workplace experience in the field of their health related undergraduate degree, predominantly in radiography. Further, university courses in medical sonography across Australia are part-time and require students to be working in an appropriate medical imaging facility in a student sonographer capacity for a minimum of three days per week for the two-year duration of their course. This requirement for practical experience acknowledges fundamental psychomotor skills and clinical experience requirements for competent entry-level practice, and meets the guidelines for accreditation from the Australian Sonographers Accreditation Registry.

The characteristics of these participants thus include prior experience in higher education as an undergraduate student, experience as a practising health professional in the field of their undergraduate degree and concurrent experience as a student sonographer in a clinical practice. All participants were undertaking their sonographer training position as part of their employment arrangements, with unchanged remuneration during the course and the expectation of significant improvement on qualification, a typical scenario for student sonographers at this time. The participants in this study were drawn from students enrolled from 2010 to 2012, who volunteered to take part in focus groups and interviews and to allow their portfolios to be examined for research purposes. Further in-depth interviews were conducted with four of the participants 12 months after they had graduated. All had retained the employment they had as students, but were now working as qualified sonographers.

Participant level by expertise model

This study required a way of expressing, in general terms, the level or stage of the participants reflecting their increasing experience as they progressed through the course and into early practice. An effective model for articulating this was found in Dreyfus and Dreyfus's five-stage phenomenological model on the development of expertise (Dreyfus & Dreyfus 2005; Dreyfus, Dreyfus & Athanasiou 1986). This model defines a continuum of expertise with five levels from novice to advanced beginner, to competence, then to proficiency and expertise (Dreyfus & Dreyfus 2005). The features of this model were used to provide terminology, adapted slightly for the research purposes, to describe three levels while the participants were undertaking their course—novice, intermediate and advanced—and one level to indicate the participants interviewed after graduation, termed graduate.

According to the model the novice depends on an instructor who provides basic rules to follow in a decontextualised environment. As experience is gained in coping with actual situations and understanding begins to develop in the relevant context, the student moves into the advanced beginner stage. All participants in this study who were within the first six months of their course were deemed to be within these two categories and were termed the 'novice' participants.

With more experience, the number of possible choices and procedures the learner might recognize becomes overwhelming. At this point, since a sense of what is important in any particular situation is still missing, Dreyfus and Dreyfus (2005) say, 'performance becomes nerve-racking and exhausting, and the student might well wonder how anybody ever masters the skill' (p. 783). One participant illustrated this particularly well, with an emphatic but disheartened comment, 'Ultrasound is daunting [even] on a good day' (interview, novice participant). To manage this overload, it is necessary to plan or devise what elements might be considered important and what can

be ignored. As novices learn to restrict the scope, decision-making becomes easier.

> Naturally, to avoid mistakes, the [student] seeks rules and reasoning procedures to decide which plan or perspective to adopt. But such rules are not as easy to come by as are the rules and maxims given beginners in manuals and lectures' (Dreyfus & Dreyfus, 2005, p. 784).

For this research, participants at this stage were considered the 'intermediate' participants.

At the stage of competence, while sometimes things do not work, at other times 'things work out well, and the competent student then experiences a kind of elation unknown to the beginner' (Dreyfus & Dreyfus, 2005, p. 784). Examples of this elation were found throughout the comments from participants in the latter stages of the course. For example one participant said with delight: 'Now I feel like I've done a good job' (interview, advanced participant). In this research, this level was termed the 'advanced' level of participants. The term 'competence' was avoided purposefully as it has particular connotations within the health professions and is tied up in professional accreditation definitions. Lastly, Dreyfus and Dreyfus define proficient and expert performers, saying:

> The proficient performer, immersed in the world of skillful activity, sees what needs to be done, but decides how to do it. The expert not only sees what needs to be achieved; thanks to a vast repertoire of situational discriminations, he or she also sees immediately how to achieve the goal. Thus, the ability to make more subtle and refined discriminations is what distinguishes the expert from the proficient performer' (2005, p. 787)

In this study a small number of participants were interviewed one year following graduation, and are termed the 'graduate' group. All of these participants were identified as proficient performers.

To summarise the labels applied, participants were identified as novice, intermediate, advanced or graduate, approximately correlating to their stage in the course as:

- Novice participants – within the first six months of the course
- Intermediate participants – from approximately six to 15 months course duration
- Advanced participants – in the final six to eight months of the two-year course
- Graduate participants – 12 months following completion of the course.

While this scheme has been used for ease of identification, it is well noted that it is never so simple. For example, there are different sonography sub-specialities to develop, such as abdominal ultrasound or obstetric ultrasound, and in each of these the participant may be more or less along the continuum depending on their exposure in their workplace. Nonetheless the labels serve as a tool for categorising the information obtained from each group. The data collected from participants at each of these levels is described in the following section. However, first, the staff supporting the students and the research needs to be explained.

There were approximately 50-70 students, spread over the two years of the program (25-35 per year), supported by various staff members. The staff involved in the day-to-day running of the program, and who were closely involved in the research, included three full-time and one part-time sonography academics, all accredited medical sonographers, and all still practicing in the profession (the full time staff at one day per week). In addition there was one physicist academic. These staff members, being closely involved in the teaching program, participated in the research from its conceptual development to its conclusion. They are called the 'teaching team' for the purposes of the study. Their role in the research was one of oversight and collaboration, and their functions included challenging the researcher's interpretations of the findings and critiquing the proposed

pedagogical solutions. A summary of the teaching team and their positions are shown in Table 1.

Table 1 – Field of Practice and Position in Group of the Teaching Team in the Sonography Program

Field of Practice	Position in Group/Education Experience
Senior academic, curriculum developer, accreditation expert, sonographer specialising in musculoskeletal and interventional procedures	Course director, lecturer, teacher in areas of expertise, clinical supervisor
Senior academic, sonographer specialising in ultrasound in obstetrics and gynaecology	Lecturer, teacher in areas of expertise, clinical supervisor
Academic, physicist specialising in ultrasound physics	Lecturer, teacher of physics
Researcher, academic, curriculum developer, sonographer specialising in abdominal, cardiac and vascular ultrasound	Course coordinator, senior lecturer, teacher in areas of expertise, clinical supervisor, researcher in this study
Junior academic, sonographer specialising in genetics and obstetric ultrasound	Lecturer, teacher in areas of expertise, clinical supervisor

Other staff included a biological sciences staff member and a social scientist staff member who taught full units in the program. Senior faculty staff (e.g., head of discipline, associate professor of teaching and learning, the Dean, etc.) had overview of the program. Peripheral to this, the university also employed some 30 casual 'clinical supervisors'. These were expert sonographers who visited the students at their practice site for support, mentoring and clinical assessment, and were allocated mostly to students in geographically convenient areas. Additionally, the university designated a suitably qualified sonographer from the students' workplace for in-house overview and assessment (many were also clinical supervisors).

Data Collection

The data collection for this research study had three components: focus groups, interviews and portfolio entries. Focus groups were held during

semester when the participants attended their on-campus block. Interviews were held and portfolios were collected after each semester had concluded, to ensure that participation in the research could not be perceived to affect grades. This will be discussed further in the 'Ethical Issues' section. A group of graduates were also interviewed 12 months after course completion at a location convenient to their workplaces.

Focus groups

The opportunity for the inclusion of focus groups enabled participants to air differing views and consider the perspectives of others. Focus groups are a form of group interview, in which 'the prime concern is to encourage a variety of viewpoints' (Kvale, 2009, p. 150). Further, Kvale (2009) states:

> The aim … is not to reach consensus about … the issues discussed, but to bring forth different viewpoints on an issue … well suited for exploratory studies … since the lively collective interaction may bring forth more spontaneous expressive and emotional views (p. 150).

Cohen et al. (2007) argue that while focus groups may be efficient they require 'skilful facilitation and management' (p. 377). This is perhaps less daunting for an experienced teacher accustomed to facilitating discussions in everyday teaching. In this research focus groups were useful as they provided input from participants immersed in the activity; that is, while participants were in the middle of the semester, actively collecting their portfolio entries. This is in contrast to the individual interviews, which had to be held after the end of the semester, producing retrospective information.

The questions asked of participants in focus groups and interviews in this research sought to obtain rich data regarding their experiences with the portfolio task. An outline of questions that could be asked was constructed, and piloted with the teaching team. However as the aim was to explore participants' experiences, these were indicative only, and flexibility was

important to continue any themes of interest as they arose. The core questions aimed to elicit information around the choices participants made when creating portfolio entries, questions around the embedded learning skills introduced into the portfolio, and explorations of the impact of the portfolio on learning, longer-term learning and learning in clinical practice.

Further focus group and interview questions necessarily varied depending on participant level as discussed above: novice, intermediate, advanced or graduate (graduate participants only had interviews). Novice participants were asked questions regarding their perceptions of the task when first encountered, preconceptions, and how they tackled the task the first time. Intermediate and advanced students were asked how they were going with the portfolio now they had more experience with it, how their choices for entries had developed, their perceptions of how it was assessed by their supervisors, and ways it contributed to their learning. Advanced students were asked for their thoughts on whether the strategies they had adopted for completing the portfolio might carry into their practice beyond the course. Graduates' questions began with general enquiries into how they were going in qualified practice and how things had changed for them now they were no longer a student. They were asked to reflect back on their experience of creating a portfolio and whether they felt it had influenced their longer-term learning. They were asked how they assessed the quality of their work and their clinical judgments after leaving the university, their strategies for completing their Continuing Professional Development requirements, and questions about their ongoing learning. The focus group and interview questions for novice, intermediate, advanced and graduate participants were submitted for ethics approval and are included as Appendix 1.

Interviews
Semi-structured interviews were conducted with participants to attempt to understand the themes of interest in their everyday experiences of higher

education and, later, of professional practice, from their perspective. Kvale's (2009) approach to the 'InterView', as an exchange of views of mutual interest between two people, was broadly followed. Using this approach the interview process comes close to an everyday conversation, but as 'a professional interview it has a purpose and involves a specific approach and technique' (p. 27). The techniques employed by the researcher included using expressions of understanding in normal language, focusing on specific situations and allowing space for considered responses, and exhibiting openness to new and unexpected themes (see explanation of interview questions in the previous section). An attempt was also made to allow flexibility, to follow the ideas generated. Keeping in mind the problem of 'power asymmetry' in research interviews, conscious efforts were made to conduct the interview carefully and sensitively (Cohen et al., 2007, p. 361). This will be further discussed in the ethical consideration section later in this chapter. Guidelines for the conduct of interviews were followed, such as those found in Kvale (2009) and Cohen et al. (2007, p. 366). From the interviews, knowledge was 'produced, relational, conversational, contextual, linguistic, narrative, and pragmatic' (Kvale, 2009, p. 53).

Interviewing in higher education in particular has received recent critique. In Clegg and Stevenson's (2013) view, reporting of interview data is under-theorised and problematic, produced as it is by academic 'insiders'. The problem of insider research as they see it is the 'sheer immersion' (p. 7) of the researcher within the field, identifying them as 'part of the habitus, with a feel for the rules of the game' (p. 7). Interestingly for this thesis, they particularly draw attention to assessment practices in higher education:

> We live the policies we are describing when we embark upon
> studies, for example, of assessment practices … So that when we
> come, for example, to interpret interview data about assessment
> practices, our embedded knowledge of the texts, statements of
> learning outcomes, assessment criteria and of multiple
> observations of classroom settings and so forth are generally

removed from the account, except where they have been explicitly analysed as part of the design of the study (pp. 7-8).

The importance of being reflexive regarding this aspect of the study, given the researchers' and the teaching teams' immersion in their university program, cannot be understated. This issue is revisited throughout the chapters.

Portfolios

A vital focus for data collection in this study was from participants' portfolios. These were collected for analysis, following their formal assessment. To maintain separation between normal teaching and the research project, other members of the teaching team marked the participants' portfolios, before passing them on to the researcher for analysis. This textual data could be considered in a way similar to an interview transcript, with the caveat that it was usually the participants' 'best work', put up for examination, and had been subject to thought and drafting. It was also 'directed' in that basic instructions had to be followed and theoretical perspectives had to be incorporated. Nonetheless, it provided an invaluable source for the interventions under study.

The criteria for the selection of portfolios included the participants' consent to volunteer for the research study, satisfactory completion of all the other clinical practice requirements for the semester, and completion of the formative or summative assessment of the portfolio for the relevant semester. Some variation in the number of portfolios investigated was due to the fact that some participants needed to retain their portfolios because of delays in clinical assessments and/or extensions granted. In some instances, not all available portfolios were investigated if the themes from the data collection had reached saturation, that is, the point at which no new information was being gleaned.

Multiple sources

The use of the multiple data sources described above (focus groups, interviews and portfolio entries) allows a view of the data from different perspectives and from different social practices, both conversation and text. This strategy is intentional, as the researcher is 'hoping always to get a better understanding of the subject matter at hand. It is understood, however, that each practice makes the world visible in a different way' (Denzin & Lincoln, 2011, p. 4).

It also assists in addressing some of the limitations of each aspect used alone. The value of interviews, for example, might be judged differently by different audiences, 'depending to some extent on their implicit epistemologies' (Kvale, 2009, p. 294). Focus group information requires skillful facilitation, as discussed above, and the textual information provided by analysis of portfolios could be criticised for its purpose as summative assessment material. The three data sources combined, addresses these concerns at least to some extent, while the iterative nature of the design research method being employed will allow many limitations to be visible over time, as will be explained further in the 'Iterations' section.

A further limitation is posed by the voluntary nature of the research. Asking for volunteers from the student cohorts represents a threat to validity due to sample bias which should not be present, for example, if a randomly selected sample of students was used. In particular, self-selection makes attribution of cause difficult, however as this study was based on interpretive epistemology, the interest lay not in causality in the scientific sense, but in finding resonant themes from which to improve the educational design under investigation. A further check that the experiences of the students who volunteered were reasonably representative of the wider cohort occurred as each of the design innovations were introduced. At around the same time as these were evaluated by the researcher for the volunteers, they were also evaluated independently for the rest of the

students by the teaching team through the normal marking processes. The themes arising from the research were evaluated against the observations of the teaching team more widely, and validated through discussions around the research and the portfolio, as will be discussed in each iteration.

In this research, as in many educational design research studies, the roles of researcher and designer are filled by the same person, which may make the critical evaluation of the design difficult. For example, the researcher may be convinced of the efficacy of the intervention, or the participants may be reluctant to criticize. While the interrelatedness of researcher and participants is expected to lead to meaningful insights, data collection from multiple sources helps to reduce bias. As Dolmans (2012) says 'triangulation of data sources and data methods is therefore of crucial importance' (p. 7).

Participant contributions

Data were collected from the novice participants through three focus groups and two interview sessions. Two of the focus groups were held in May 2010 (17 participants) and one was held in May 2011 (8 participants). The number of participants in the focus groups is shown in Table 2, and their timing is identified in the research schedule diagram in Figure 3 (blue diamonds). Of the two interview sessions held with novice participants, one was at the end of May 2010 (4 students) and one was in June 2011 (4 students). The number of participants in, and the timing of the interviews, is also identified in Table 2 and Figure 3 (pink squares). The novices' portfolios were not examined due to the very formative nature of the participants' early entries, and the need for a one-day turn around in marking during the on-campus block, so that students could take their portfolios away with them and continue working on them uninterrupted for the remainder of the semester. Neither interview nor focus group data were collected from the 2012 cohort when they were novices, as the changes to the induction procedures were minor and had been sufficiently evaluated using the 2010 and 2011 cohorts.

Data from the intermediate participants were collected across all three cohorts through three focus groups, two interview sessions and portfolios. The focus groups were held in September of each year (8, 7 and 6 participants in 2010, 2011 and 2012, respectively). The number of participants in these focus groups is shown in Table 2 and their timing is identified using blue diamonds in Figure 3. Two interview sessions were also held with the intermediate participants: one each in December of 2010 and 2011 (4 and 3 participants respectively). The number of participants is shown in Table 2 and the timing of the interviews is identified by pink squares in Figure 3. Portfolio data from the intermediate participants was collected at the end of the second semester for all three cohorts (8, 8 and 6 portfolios at the end of the first year of study for the 2010, 2011 and 2012 cohorts respectively). The number of portfolios investigated is shown in Table 2 and the timing is identified by yellow triangles in Figure 3.

Advanced participants volunteered for two focus groups, two interview sessions and investigation of their portfolios. The focus groups were held in May of 2011 and 2012 (7 and 5 participants, respectively). The number of participants in the focus groups is again identified in Table 2 and Figure 3 shows their timing (blue diamonds). The interview sessions were held in July of 2011 and 2012 (3 and 2 participants respectively). Table 2 and Figure 3 show the number of participants and the timing of the interviews (pink squares) of the advanced participants. Portfolio data was collected from the advanced participants in the 2010 and 2011 cohorts (9 and 7 portfolios, half way through 2011 and 2012 respectively). Table 2 and Figure 3 again show the number of portfolios investigated and their timing (yellow triangles).

The graduate interviews (4 participants) were held in December of 2012 (see Table 2 and Figure 3).

Table 2 – The Number of Participants in Each Group by Year and Level

Year	Data type	Novice	Intermediate	Advanced	Graduate
2010	Focus Group	17	8		
	Interview	4	4		
	Portfolio		8		
2011	Focus Group	8	7	7	
	Interview	4	3	3	
	Portfolio		8	9	
2012	Focus Group		6	5	
	Interview		0	2	4
	Portfolio		6	7	

Research Schedule

In the section of this chapter 'Participant level by expertise model', the participants were identified as having novice, intermediate, advanced or graduate level expertise in their new profession, which corresponded approximately to their progress through the course. Also discussed were the cohorts of students from which volunteer participants would be sourced. The project commenced in 2010, so participants were recruited from the cohorts commencing in 2010, 2011 and 2012. The 2010 cohort, for example, evaluated the existing portfolio task, then the first iteration that added requirements relating to independent learning, judgment and reflection, then also the second iteration that added self-assessment and competence. Also in this figure, the red squares show the points at which the portfolio was redesigned. Redesign episodes occurred first in July 2010 following iteration 1; in January 2011 following iteration 2; and in January 2012 after the analysis of iteration 3. A further redesign is indicated in January 2013. While not reported in this thesis, this relates to the redesign based on the analysis of the third iteration. Figure 3, the research schedule, is presented below.

Figure 3 Research Schedule

Research Schedule
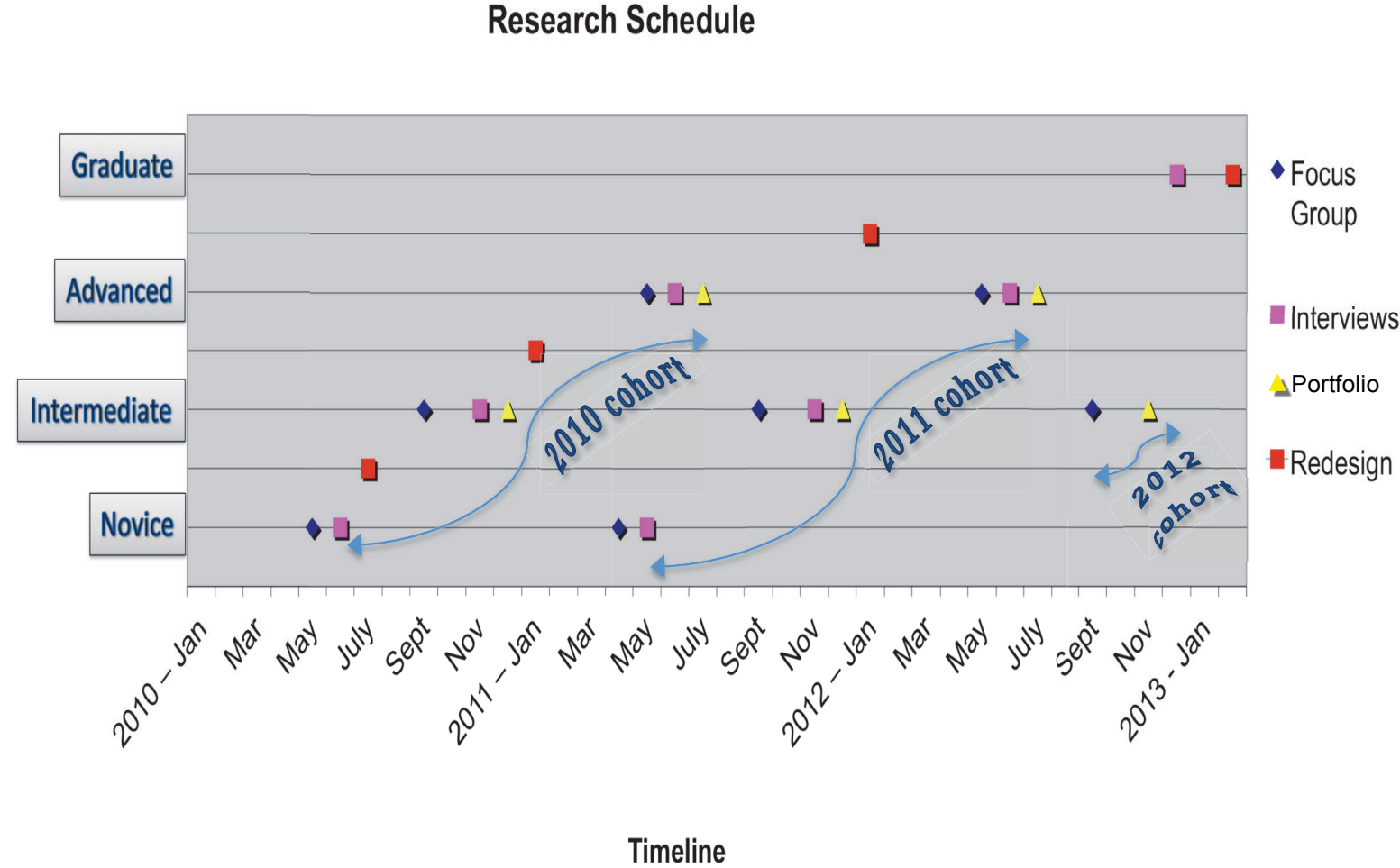
Data Analysis

Data were collected by digital voice recorder for both interviews and focus groups. All recordings were transcribed by the researcher using a format suitable for entry into the data management software NVivo (QSR International), versions 9 and 10. Text from portfolio entries was copied, in the case of a paper portfolio, de-identified in a Word document and then transferred into NVivo; or where possible, cut and pasted from electronic versions into NVivo. Data management software allows for storing, handling, manipulation, coding, analysis and the development of themes in complex data collections. It enables easy searching of data 'for similarities, differences, patterns and relationships' (Lewins & Silver, 2007, p. 82). Coding, in interpretive research in particular, provides a way of sorting, categorising, reflecting on and developing new ideas about the research data. During the process of coding, annotations and analytic memos help to keep track of the researcher's developing thoughts. They allow notes 'somewhat comparable to researcher journal entries … about the participants, phenomenon or process under investigation' (Saldana, 2009, p. 32). Both codes and memos provide prompts for reflection on the deeper meanings and interpretations of the participants' information in the transcripts.

Initial exploration of the data through coding was performed throughout the project for each focus group and interview as soon as they occurred. The focus groups were conducted first in each cycle, with their coding and initial analysis enabling further directed questioning, useful for clarification in the subsequent interviews and investigation of portfolio entries. While some believe it is beneficial to preselect codes for congruence with research questions or conceptual frameworks (Saldana, 2009, p. 49), coding in this project was kept 'classically' unstructured in the initial attempt, to allow ideas to emerge. Immediate coding allowed the researcher some discretion on the issue of the number of interviews to conduct and the number of portfolio texts to examine, allowing termination at the point of saturation of

data. This ensured a comprehensive evaluation of each phase of the research.

As the project matured, themes were consolidated and fewer new codes became apparent. Secondary coding enabled an attempt to see 'the "big picture", discovering the core themes or the overriding pattern' (Richards, 2009, p. 172).

The development of coding during this research was evident, for example, in the initial focus groups. Codes such as 'collecting evidence' 'confidence', 'keeping up' and 'success' were created, where transcripts indicated participant references to the portfolio as being useful for 'collecting evidence', where the portfolio allowed them to record an element of practice where they were 'confident' in what they were doing, could show they were 'keeping up' or had inferred they were happy about their 'successes' being recorded in the portfolio. Over time, these initial codes were consolidated into the theme 'demonstrating achievement', as will be discussed in Iteration 1.

Ethical Considerations

This research explored students' perceptions of their experience of an assessment task in a University course. The major ethical concern in the study was the power relationship held by the researcher, who was also the participants' lecturer and course coordinator (with the exception of four interviews held after those participants had graduated). To ensure students volunteered freely, the email request for participation and enrolment into the study was conducted by an independent person (a member of the administrative staff), operating at arm's length (see Recruitment Email, Appendix 2). The Participant Information Letter (see Appendix 3) clearly stated that participation was voluntary and that participants could freely withdraw at any time. Participants were asked to read and sign an ethics

approved Consent Form (Appendix 4) prior to commencing the study, and were also reminded of the voluntary nature of participation at the commencement of all focus groups and interviews and permission was obtained from the group or interviewee to record the session. The researcher made eye contact with each participant in each focus group and interview to ensure all were agreeable. The introductory explanations, by the researcher to the group or interviewee on each occasion, contained comments to this effect. For example, the preamble to the first focus group included:

> doing this is entirely voluntary, and … you can stop at any time and that will be completely ok … so today we are going to discuss the professional practice portfolio and your experience with it, and I don't really want to know if it's good or bad, I just want to know about how you went about doing it and what you think about it, and maybe how the other things you do in your course interact with it. It might seem that I repeat some questions, but that's just to make sure I really understand, so if you don't mind, try to answer (preamble from researcher to participants from focus group 1).

Any assessment task may cause psychological distress to university students, raising the possibility that the discussion of assessments may have caused some participants to experience unintended effects. However, at the postgraduate level, this effect could be considered rare as participants have demonstrated prior success at university. In this study, no instances of such distress were reported to the researcher or the Human Research Ethics Committee. Anxiety to perform well in front of the course coordinator could also have induced distress. In the ethics application, it was stated that if at any time either of these forms of distress occurred, the researcher would notify the participant that the research would cease at that point. As an academic staff member, the researcher would then deal with any student issues in the normal role of academic advisor, referring the student to the university counseling services as required. Fortunately, no such cases arose.

In addition, a very slight possibility was envisaged that a participant could have tried to take advantage of the relationship formed as a participant in the research to coerce the researcher as teacher into providing preferential treatment. While this situation was not encountered, it could have been dealt with by reminding the participant of the voluntary nature of participation, ensuring they understood that no obligation existed for either party. The researcher was constantly mindful of the responsibility not to allow the research process to compromise teaching, learning or participants' perceptions of their learning.

At the conclusion of the study no instances of ethical concern had been raised by any research participant in any focus group or interview, nor did any withdraw from the study.

Ethics Approval

The University of Technology, Sydney, Human Research Ethics Committee granted ethics clearance for this study, and the research was conducted in accordance with their Ethics Policies and Guidelines. Permission to conduct research on the university students of the researcher's institution was also sought from that universities Human Research Ethics Committee, who granted ratification. The Ethics Approval Letter is included as Appendix 5.

The researcher ensured ethical guidelines were fulfilled and upheld respect for the participants' time, efforts and valuable information. At each focus group and interview, it was reiterated that participation was entirely voluntary and permission was obtained to record the session. When gaining permission, the researcher made eye contact with each participant in each focus group and with each interviewee to ensure their agreement. The participants were also reminded that participation was completely voluntary and they could stop their participation at any time without penalty. Focus groups were held in lunchtime sessions with food provided so

that they did not interfere with the participants' study program. Interviews were held in convenient cafés or other sites away from the participants' workplaces, at a time that did not interfere with participants' work. As previously mentioned, interviews were conducted after completion of the semester to ensure assessment results were not compromised. The portfolios identified for the research were only collected following the formal assessment process which was undertaken by the teaching staff other than the researcher. Data collected in the form of digital audio were stored on a password-protected computer. Once transcribed, focus group, interview and portfolio data were de-identified.

Reflexivity

This section addresses the reflexivity that is essential to an interpretive approach to research that is conducted in a complex social environment with significant power relations. It will be written in the first person. I am mindful of the fact that the change in tense and the allocation of reflexivity to a separate section makes it appear segregated; however my intention is to address reflexivity throughout, so I will make comments throughout where needed, which say 'the researcher …'.

My interest in portfolios had started when introduced to them in a Master's in Health Education degree I commenced when I started my first academic position some dozen years prior to this study. Impressed with the help a portfolio provided me in my course, I introduced a portfolio task into the Clinical Education program of the sonography program shortly thereafter. I found assessing my students' portfolios gave me an excellent insight into their context, level of practice and how they were progressing. The various portfolio entries also provided an excellent vehicle for discussion with students during clinical supervision visits. It helped me to show them how the theoretical knowledge presented in their degree could be applied in practice. Of all the tasks I assessed in the program, it most readily provided

an excellent source of reflective discussion. It was also the most enjoyable as it appealed to my professional self: I identified with the early struggles of and felt empathy towards the students; experienced feelings of pleasure for them as they celebrated their early successes; and could help in practical ways as issues emerged for them.

My experience with the task led me to the opinion that a few crucial additions could enhance the effect of the portfolio and better align it with the goal of learning for the longer term. These aspirations led to the research study. It also made the research challenging, as I was invested in it and wanted it to be successful. I addressed this issue by remaining aware of it, presenting all findings to the teaching team of which I was a part, and listening carefully to their concerns and alternate opinions. I undertook no decision regarding the portfolio alone, and all conclusions regarding the research were corroborated with the teams' experiences with the rest of the student cohort who were not participating in the research.

When doing the research, I knew it was crucial to separate my teacher self from my emerging researcher self. I understood my position of power and knew that regardless of how nice, kind or accommodating I tried to appear, that the underlying perception of me would be as a person with the power to influence the participants' academic results and/or perception by colleagues. I addressed this concern by emphasising the voluntary nature of the research, as mentioned above. I also ensured the data collection from interviews and portfolios was conducted such that participants' results could not be compromised. I ensured students who were not participants were not disadvantaged in any way.

The next three chapters will detail the three data collection iterations and begin the process of furthering the theoretical understandings generated by the educational design research approach.

Conclusion

This chapter has outlined the methodology for this research into the design of assessment aimed at fostering longer-term learning. As argued in chapter 2, the capacity for continued learning is pivotal for the students' trajectory from university to professional practice. An overarching interpretive paradigm and consideration of the commonalities of practice theories helps this study locate learning as a social practice and interpret data in the complex social settings of a university course and a health profession. Educational design research is shown to provide a useful framework through which to investigate the data this study generated, and a particular phasic method of iterative cycles was identified to build understandings around data generated from pedagogical interventions. The university and professional settings have been noted and the participants and their context explained. The data collection methods (interviews, focus groups and portfolios) are outlined, culminating in a research schedule depicting the timing of data collection. Data analysis methods and ethical considerations are discussed. This methodology chapter sets up the empirical investigation to be commenced in the next chapter.

Chapter 4 Portfolio Iterations

Introduction

This chapter begins the study of a portfolio assessment into which five pedagogical interventions will be introduced as a result of three iterative cycles of testing. Research participants from three student cohorts in the professional higher education course described in chapter 3, evaluate each implementation. This chapter, which consists of the baseline research into the existing portfolio is the first stage of the iterative cycles of the testing phase of the educational design research approach being used. The two chapters to follow, chapters 5 and 6, will present the second and third iterations, respectively, in which the interventions to foster longer-term learning are added to the portfolio. Chapters 7 and 8 investigate the participants' continuing learning practices as new graduates, 12 months following completion of their studies.

This chapter reports on the important first step in the design process, the research into the existing portfolio assessment prior to the interventions. The portfolio task had been considered, anecdotally, a very useful assessment over a number of years by both staff and students. Thus it was necessary to start the research by identifying, evaluating and retaining its valuable features, from both the participant viewpoint and from the perspective of educational effectiveness. The findings show that the existing portfolio is valuable for continuously engaging participants and building their confidence through the demonstration of early achievements, but that it requires significant induction. These first research findings, discussed below, start the process of gaining understandings and developing early theories; that is, 'substantive theories, ones that are particular to the substance of their data' (Richards, 2009, p. 137), which will be further developed in subsequent iterations.

As discussed in chapter 3, each iteration uses an educational design research approach and, in particular, the framework proposed by Bannan-Ritland (2003) and Bannan-Ritland & Baek (2008). This framework allows the systematic exploration of the research questions through four phases (see the Educational Design Research section in chapter 3). During the informed exploration phase initial perspectives are generated about how students learn and perform, and the corresponding design directions to take are identified (Bannan-Ritland & Baek, 2008, p. 301). Applying this phase as it pertains to this chapter then, involves identifying and describing the existing portfolio, generating initial theoretical perspectives from participants' perspectives of their learning from the portfolio, and deciding on the redesign features for the next iteration. The second of the phases, the enactment phase, includes design, articulation and redevelopment. This phase is reflected in this chapter through the discussions of each of the themes identified, which are subsequently evaluated by the teaching team and redesigned in the second iteration phase. The third phase, the local impact phase, investigates theoretical understandings through the particular cohort being investigated. This section follows the description of the task and resulting themes from the focus groups and interviews. Finally, the last phase, the broader impact phase, relates the findings from the themes generated by the participants to the literature to provide the researcher and teaching team with a background understanding to enable further exploration of the significance of the themes for the portfolio redesign efforts.

This chapter starts with a detailed description of the existing portfolio task, then revisits the questions asked of the novice focus groups and interviewees to identify emergent themes.

At the commencement of the study, all students in the first cohort (the 2010 cohort) were enrolled in a subject that required the completion of a portfolio assessment. Research participants were recruited from this cohort, as

described in chapter 3. These novice participants then undertook the portfolio task for 12 weeks, between their orientation to the course and the first on-campus attendance, where it was submitted to the university staff for formative assessment. The instructions for the portfolio task were minimal, limited to less than a single page of text within the Unit of Study Guide. Participants were asked for:

> A collection of images, minimum of one per week during each semester (approx. 16 per semester), which have been scanned by you, and which represent a learning experience from your clinical practice. These must be continuous, dated, and in chronological order. The text which accompanies each entry (max. ½ page) should demonstrate that you have researched and understood the significance of the image(s), and applied it to the clinical setting. (Clinical Practice Information, Unit of Study Guides, Graduate Sonography Program, 2009).

This was followed by brief instructions to keep a logbook of all studies performed, with a small table of suggestions (e.g., this image is 'an example of normal anatomy' to be followed by a comment such as 'this is the best example I have seen of …').

All students, of which the participants were a subset, were given a one-hour tutorial session at the commencement of their first semester about their 'Clinical Practice' units of study. The curriculum comprised both 'Clinical Practice' and 'Academic' units of study, which were typically complementary. For example, the academic 'Abdominal Sonography' unit had a complementary clinical practice unit called 'Clinical Practice in Abdominal Sonography'. Each clinical practice unit had the same assessment program, consisting of two clinical assessments, a written 2,000 word Case Study and the Portfolio. For clinical assessments, a university supervisor, university-appointed supervisor or workplace supervisor would attend at a scheduled visit (approximately 3 hours) to observe the students' performance of

ultrasound examinations of patients in their workplace, provide guidance and instruction, and complete clinical assessment forms. This observation of real life workplace routines provided an authentic assessment of student performance. The case study allowed the student to follow one patients' holistic experience from symptoms, clinical history, differential diagnoses and referral for their ultrasound test, to complementary imaging techniques and, where possible, outcomes. The portfolio gave an excellent overview of student exposure to different practices and experience. The assessments were weighted in value towards the clinical assessments, while the Case Study and Portfolio had similar weightings of about 25% each.

In the one-hour tutorial session, exemplars of past student portfolios (as well as case studies, both with permission) were passed around the class. The practicalities surrounding the clinical assessment visits in the students' practice settings were also presented and discussed. The tutorial was thus not specific to the portfolio task, but covered all three components of the Clinical Practice assessments (portfolio, case studies and clinical assessments).

Despite this simple approach, the portfolios submitted by most students over a number of years contained well portrayed, thoughtful accounts of moments of practice that students and assessors alike found helpful in facilitating discussion of the students' clinical progress. Students appeared to value the task: 'it truly was a great learning tool' (novice participant, unsolicited personal email communication, 2010) and assessors appeared anecdotally to appreciate the wider scope and range of clinical experiences captured by the portfolio, compared to other clinical assessments, which allowed rapid assessment of the students' practice setting and clinical progress.

The first iteration was thus, by rigorous appraisal, aimed at those features in the existing task that were successful pedagogically and worked well for

participants, and those areas in which the portfolio was not working well, to find improvements. When the participants attended campus for their one-week block, 12 weeks after their orientation block, they were divided into two focus groups of 10 and 7 (for convenience) for discussion of their portfolio experiences. It was reiterated that participation was voluntary as discussed in chapter 3. Two teaching staff (including the researcher) attended each focus group, with each taking approximately three quarters of an hour.

As detailed in chapter 3, the interview questions asked of these novice participants included:

- When you first heard that you would be asked to do a portfolio for the course, did you have any reaction to that? (The purpose of this question is to discover any preconceptions and whether the participants were familiar with this type of task. If so, was it a positive or negative experience?)
- When you had the first tutorial about the portfolio, was it what you thought a portfolio would be, or was it something different? (The purpose is to discover what they were expecting, and whether the task was any different?)
- So I want you to think about an example where you wrote up a pathology finding (a portfolio entry). What happened when you looked back at that patient's scan? (The intent was to ask about their reflective practices without saying the word 'reflection'.)
- When you are writing up each entry, do you think about what you might have done or should have done in that situation?
- Did you find the portfolio helped you to learn?
- Do any of the other assessments in the course impact on your ability to complete the portfolio or do it as well as you would like?
- Does completing your portfolio have any effect on any of the other assessments in the course?

The researcher led the discussion, allowing it to flow where possible, encouraging all to participate and trying to cover all the questions. The results are reported next.

Iteration 1 – Findings

The focus group audio recordings were carefully transcribed and formatted by the researcher, then entered into the qualitative data analysis software, NVivo 10 (QSR International Pty Ltd. Version 10, 2012) as described in chapter 3. An initial analysis allowed emerging themes to be mapped, and attention to be given to any ambiguous meanings or interpretations. At the end of the semester and following completion of all the assessment requirements, a further four participants were recruited by the researcher for semi-structured interviews. This allowed exploration of the emergent themes in greater depth and complemented the focus group data. After four participant interviews, the themes were steady and clarity was attained on outstanding issues. Therefore no further participants were recruited. The audio recordings were transcribed and entered into the data management software.

A full interpretive analysis, as discussed in chapter 3, established the final themes as reported below. Four strong themes emerged:
1) Portfolio Induction – Two important themes emerged as areas needing improvement around the orientation to the portfolio: a) Guidelines and Time constraints and b) Marks
2) Demonstrating achievement – This was the major benefit of the existing portfolio as perceived by participants and staff
3) 'Reflection' – This was discussed as problematic by participants.

In the following discussion of each of these emergent themes, quotations provided by the participants are annotated by focus group (fg). For interviews, the abbreviation used is 'int', and the participants are identified

in this and the following two chapters by stage, as discussed in chapter 3: 'novice', 'intermediate', 'advanced' and 'graduate' participants. Thus, for example, a quotation from the transcription of an interviewee in this chapter will be followed by (int, novice) indicating interview of a novice participant.

Portfolio Induction

The novice participants from the first cohort gave recurring comments indicating the areas they would like to see improved. These related to the provision of better guidelines in the written instructions, better orientation to the portfolio and access to more examples. These are grouped under the theme of portfolio induction and each is discussed below.

Areas for improvement – Guidelines and examples

A number of participants discussed having difficulty interpreting the guidelines when they came to write up their portfolio. One comment, which started a more general discussion about the guidelines, included:

> I guess when we looked at, cause, I mean (another student) and I are at the same practice, so I guess when we looked at what you wanted, *I found it really nondescript.* I didn't sort of find there was an outline or a guide as such … as a result we sort of went and approached someone who we knew had done it and asked if we could look at theirs…just sort of to get an understanding of … um, what we needed to sort of do, um probably not a great example cause there were pages and pages for each thing (laugh), so … we were aware it was supposed to be a brief thing … so yeah, we went about it like that (fg 1, novice, italics added).

Later in the conversation, there were again comments about the lack of instructions, such as, 'Yeah, like we are used to having headings and everything set out for us …' (fg 1, novice participant). Another participant

interrupted on hearing this comment, indicating that he enjoyed the freedom of the minimal instructions, and commenting that he felt this was appropriate at a postgraduate level of study:

> no, that's a bit undergrad … I like that it is left a bit open cause it's postgrad stuff … it's here, get a picture and research it … I like that part of the deal' (fg 1, novice participant).

Others in the focus groups commented that the lack of guidelines had led them to seek advice from previous students, particularly from those working in their departments. All four interviewees had done this. For example:

> 'well … I knew we had to do a portfolio so I asked the sonographers at work what they did for it, and what the structure was … um … I got an example from one of the girls at work; it wasn't hers, it was an example she used, from previous years … but I liked it cause it had a structure to it … so I followed that … and it made it a lot easier … (int, novice participant)

and

> 'so I spoke to someone else who spoke to someone else who had previously done the course … and they actually showed me one of theirs and I say Holy Cow .. I was behind the eight ball. So initially I found it a bit daunting … because as simple as it is, just one page of pathology, it can be … it can be a big task, initially, that's for sure' (int, novice participant).

As sonography is a relatively small profession, many ultrasound departments throughout Sydney, rural NSW and beyond have had consecutive students through the program over a number of years, so one way to determine what should be in their portfolio was to see what others had done. While seeking resources such as this is a valuable component of independent learning, on analysis it was felt this pointed to the need to make the written instructions clearer. In addition, the 'examples' provided were minimal, and the participants felt they should be able to see examples

of good (and perhaps bad) work. As Yorke (2003) points out, such instructions 'are generally insufficient to convey the richness of the meaning that is wrapped up within them. Exemplifications and discussion are needed for understanding' (p. 280). As mentioned above, the participants had attended a tutorial session that included information and exemplars at the start of their course, 12 weeks earlier; however, this was just one hour and covered all three assessment methods in the 'Clinical Practice' units, of which the portfolio is only one. It also occurs in the first day or two of the course, when students may be overloaded with information. Even with prompting, participants only vaguely recalled attending the tutorial or seeing the portfolio examples. This issue of exemplars and the efforts to improve the induction will be discussed below in the 'evaluation: local impact' section.

Time constraints and 'marks'

Time constraints raised the most emotive discussion from the participants in both Focus Groups 1 and 2. One volunteer stated: 'My last three entries were rushed because I just knew I had to get it done by Monday morning but before that, the earlier ones … (were ok)' (fg 1, novice participant). Eliciting further ideas about this revealed that many participants had left their portfolio entries until the last minute. One commented 'it just takes a lot of time' while others contested this view, with another participant commenting that, 'I think it's realising also that it doesn't take that much time … it doesn't matter what you do, you will always be pushed for time, but knowing that you have to do it every week [was better]' (fg 1, novice participant).

It became apparent for this group that the portfolio entries had received favourable attention until the point of impact of the demands from other assessment tasks. In the second focus group, one participant complained 'it's just hard to find time to balance everything out'. Another said 'I gave up after about 6 weeks … I was like … groan …' (fg 2, novice participants),

then 'but it was when the physics assignment was due in [general agreement] and then the exam, and then coming to this [attendance on campus] and then that's when it started to fall off' (fg 2, novice participant).

The staff member present in focus group 1 noticed this effect as well, stating 'that's interesting … you can tell that a little bit in the ones I've marked … some of them, they're really good in the beginning … and you can tell that (the attention to the portfolio faded)' (fg 2, staff member).

One interviewee encapsulated the feelings of participants towards the portfolio task as a positive learning experience, influenced in the end by time pressures as other assessment tasks loomed and the semester progressed. She felt 'the final straw' for her was that for this first semester, it was not worth a 'mark':

> when I do it and actually get into it and actually look up journal articles and … you learn so much even if you don't write it down … um, it's just the (rest) of the course ... (impacting) … and unfortunately because this was one thing that wasn't getting marked this semester, some things had to come before it (fg 1, novice participant).

It is well recognised that students align their efforts with the assessment processes that lead to high stakes summative marks and grades, as discussed in chapter 2, and that this plays a key role in how they spend their learning time. One interviewee commented:

> I wasn't aware of that [that it was not marked] initially, so I put the same amount of effort in as I have with the recent one … so yeah … cause if it's not to be marked then you can get a bit of a relaxed attitude towards it (int, novice).

The portfolios of the participants reported in this chapter are assessed formatively after 12 weeks, when they are attending the university for an

intense on-campus block (usually one week). The sonography teaching staff use the opportunity created by a day of physics teaching within the block to meet together as a group and evaluate each students' portfolio. The group setting creates an intense session where portfolios might be passed around or discussed, entries which may not be within one staff members' expertise can be handed to another whose is, and entries that raise any issues, such as patient safety or professional conduct, can be discussed on the spot. These novice portfolios typically demonstrate good efforts to learn in a new environment, but fairly common errors include a lack of evidence-based research (relying on a supervisor's advice or just 'google-ing') or a lack of basic understandings of common anatomic appearances using ultrasound and/or pathological processes. Many formative comments are written on various portfolio entries, a marking rubric is completed, and the marking is completed by the end of the day (see marking rubric, Appendix 6, used for both formative and summative assessment of portfolios). The students' portfolios are returned the next morning, with time allowed for one of the lecturers to debrief the portfolio marking in general, to discuss common misunderstandings with the students, answer any questions and provide advice for the next submission. Any student whose portfolio has not reached an acceptable level for this stage of their studies is asked privately to meet with one of the teachers and is given help. This formative assessment ensures not only that students are managing the task, but that they are gaining the valuable learning intended by the task, understand what is required and are completing the entries required at the level needed. At this early stage of the students' venture into a new profession, guidance and assistance is much preferred to giving a grade, as discussed in the formative assessment section in Chapter 2.

Demonstrating achievement

The value of the portfolio to participants' learning was explored through questions such as 'Has the portfolio helped with your learning (and if so how)?' For these novice participants, the focus groups and interviews

identified the requirements for continuous portfolio entries as a means for demonstrating their early achievements. Participants used their portfolios to demonstrate a raft of early successes. One participant recalled 'the first time I could visualize the pancreas without any gas overlying it' (fg 1, novice) which prompted a spontaneous cheer from the focus group who sympathised with the difficulty of mastering this technique. Other participants described the difficulties and insecurities of being a novice in the early stages of practice, 'you look at something and you go "That doesn't look right!" or "what am I doing wrong?"' They moved on from this stage, to become pleased with the fact that 'I was able to identify that it wasn't *normal* and then, yeah, go from there' (fg 1, novices).

The portfolio was also seen as a way of providing evidence of engaging in practice. One participant commented that she 'looked at it as collecting evidence, as well, of what you are scanning and how much you are scanning' (fg 2, novice). Another commented:

> I do find the portfolio a great learning tool … it's one of the best
> learning tools, I've found, because it makes you look for something,
> pull it out, and digest it … I do like looking at the pathology of it
> … because there's more information about it, it's a bigger return,
> and it's mentally stimulating (int, novice).

Another interviewee liked the idea that the portfolio showed her personal achievements:

> I do honestly like the portfolio a lot better than the case studies …
> it's more personal … it shows that you can … demonstrate
> through the whole semester that you are scanning different
> things every day (int, novice).

The teachers also found the requirement for demonstrating weekly portfolio entries useful. This showed the participants were thinking about their

practice even at this early stage, and it allowed evidence of progress over time. One teacher stated:

> what I think is that if it's not perfect (the example in the portfolio) it's still all right to put it in … because even if they don't see that it's not perfect we can still say this is what we would do to improve it … or if they do know it's not perfect even better, 'cause then you can say in your thing (portfolio entry) well I can improve this by … cause that's what it's all about … and they'll see it later … (fg1, staff).

These comments from both participants and staff show that the positive aspects of the original portfolio assessment lay in the requirement for continuous engagement in areas of practice that were interesting to participants. Often participants had not encountered such an example before and this stimulated learning. This will be discussed further in the evaluation section.

Reflection

The notion of the portfolio task being 'more like a reflection than, sort of, an assignment' (fg1, novice) was raised, without prompting, by one of the participants, within the first five minutes of the discussions of Focus Group 1. This was in response to the question 'What I want to know about is how you went about doing it?' (fg1, researcher). On further questioning, a number of participants said they had experienced a reflective journal in undergraduate degrees, and agreed that this was how they had approached the task. Another student who had not, became quite concerned that she had missed the point of the exercise due to her interpretation of the task: '… the reflective part, I think I sort of missed that, the reflective bit …' (fg1, novice). Interestingly, one participant had specifically chosen not to focus on reflection, lamenting that he 'did terribly at reflective journals in undergrad. I didn't get the point of it at all' (fg1, novice). A number of participants

nodded and murmured in agreement when he said this, indicating they had also struggled with their reflective journals. This participant had specifically chosen to direct the focus of the task elsewhere, saying:

> ' and so what I tried to focus on, … I think I focus a lot on pathology … so, everyone would talk about (a particular pathology) in newborn care and it would be things like…'this is a Grade I, that is a Grade II and I didn't even know what it was until I saw my first Grade II so I did this thing (portfolio entry) on it and just labelled it … and talked about that was significant cause it was the first Grade II I had seen' (fg1, novice).

Since Schön's (1983, 1987) original work on the reflective practitioner, a strong emphasis on utilising reflective practice to enhance student learning, such that in most professional courses 'reflection and the promotion of reflective practice have become popular features of the design of educational programmes' (Boud & Knights, 1996, p. 191). As mentioned, the written instructions asked participants to 'show that you have reflected upon your clinical learning'. From the focus groups it is clear that 'reflection' means different things to different participants, and their perceptions are influenced, positively or negatively, by their previous experience with tasks such as reflective journals. Recent work on reflection has shown that getting it right is difficult, with arguments arising that reflection is being used poorly in some instances and with ethical implications that may not be fully appreciated by teachers (Bulman et al, 2013). Reflection was identified as one of the important components of longer-term learning as discussed in chapter 2, and is an intended inclusion into the portfolio in the second iteration. Response to this tension around reflection will be discussed in the Local Impact section below.

Evaluation: Local Impact

The goal of the local impact phase of the framework proposed by Bannan-Ritland (2003) is to research how well it satisfies the participants, and to inform and refine 'both ... theories and redesign efforts' (p. 23). This evaluation was undertaken not only to satisfy the participants, although their feedback was central, but also to ensure that those elements found to work well were not impacted in the redesign efforts. As discussed above, the thematic analysis of the novice focus groups and interviews identified four important issues. Each is described briefly here and then treated individually.

The first theme centered on the minimal nature of the information provided about the portfolio task. The participants identified a need for more comprehensive guidelines for explaining the task. They also believed further examples of portfolio entries might help them in their first attempts to identify what was required of them. This suggests a need for greater attention to students' induction into the task. The second and most emotive theme was that of time constraints, affecting how and when the participants interacted with the portfolio and, in particular, the effect of other assessment tasks on the time spent and effort invested on each entry. This suggested that teachers should ensure sensitive time management of assessment tasks across the program. The third theme arising was the role of reflection, with the discussions revealing that participants' prior educational experiences was affecting how they approached the task. The fourth and final theme was satisfaction with the continuous use of their portfolio for demonstrating their progress and achievements. This is an identified advantage and should not be lost in the redesign.

These findings were discussed and debated within the teaching team and design changes were negotiated, which then had to be approved by the senior learning and teaching staff of the department. Given these staff were

supportive of the research, the suggested changes were based on sound pedagogic principles, and formulated from the feedback of participants, this proved unproblematic. There were negotiations within the teaching team around allocating additional time to the introduction of the portfolio task, but this was managed without affecting other teaching. The one-hour tutorial mentioned previously, that had covered the overview of all three components of the 'Clinical Practice' requirements, was reviewed, as discussed below.

In response to the feedback asking for more comprehensive guidelines on the portfolio task, the written instructions were clarified and extended from one to two A4 pages in the Unit of Study Guide, with further discussion of the selection of entries, additional information regarding the written description students should provide with their images, and greater guidance on sourcing references. The modified instructions are included as Appendix 7. However, it was important not to detract from the idea of allowing students some space for interpretation. In a guide for the Association of Medical Education in Europe (AAME) on portfolios for assessment and learning, van Tartwijk and Driessen (2009) advise a flexible, learner-centered format for portfolios. They caution that: 'a rigid structure in which every detail of portfolio content is prescribed will elicit negative reactions from portfolio users. Too much structure is a greater risk than too little structure, but learners do need clear directions and guidance' (p. 790).

Further to this, an entire one-hour tutorial was dedicated solely to the portfolio task, and a scenario-based experiential learning exercise was developed. Conducted in small groups using real-life patient scenarios, images and reference materials, students could choose two out of six to complete in the hour (usually choosing the ones most closely related to their practice particularities) and create a 'portfolio entry' for each. Tutor support was encouraged throughout and at the end of the hour the whole group came together for discussion and debriefing. Students thus finished the

tutorial with two 'exemplar' portfolio entries they had created themselves to use as a template for further work. As Yorke (2005) points out: 'Compiling a portfolio is a sophisticated exercise … and the novitiate compiler is likely to need some advice regarding structure and content' (p. 29).

While the negotiation of improvements to the portfolio guidelines and design of a dedicated portfolio tutorial was unproblematic, discussion around 'reflection' proved less so. Staff members accustomed to 'reflective journals' in their other teaching areas felt that reflection should be 'taught' upfront and incorporated specifically in the portfolio. Conversely, those less familiar with using reflection in teaching were unsure about a change in this direction. It had been determined in the investigations leading up to the pedagogical changes that a reflective activity would be incorporated, but later in the program. As the focus group showed, the participants had varying experience with and/or exposure to 'reflection' in their previous courses, from no experience at all to being assessed on reflective journals. This had to be taken into account. In the end, the team agreed that for the reflective aspect of the task to be successful, extra resources and time would be needed for students who had not worked with reflection before, adding a greater burden on some of the novice students compared to others. It was decided that for this iteration, reflection could form part of the portfolio tutorial debriefing should students raise it because of their experiences. However, its planned inclusion was to be left until the second iteration of the portfolio, when it would become one of the design elements included to foster longer-term learning. At that point, students would be more experienced with their portfolio and would have early learning material to draw on for reflection on their progress.

The issue participants raised of time constraints affecting their ability to devote time to the portfolio is not surprising. It has long been recognised that students work to deadlines. Thus in most programs, attempts are made to spread assessment tasks over the timeframe to make it as equitable as

possible for students. The requirement for 'one portfolio entry per week' was therefore discussed within a program in which assessments were already spread out reasonably evenly. The idea of reducing the number of portfolio entries, such as to one per fortnight rather than one per week, or to 10 per semester, and so on, was considered. However, the team decided against this, supported by the important comment from one participant reported above that: 'I think it's realising also that it doesn't take that much time' (fg 1, novice). The teaching team also felt that perhaps the issue was that the students were adapting to the new time management strategies required to fit a new course into their already busy lives. These participants were new students undergoing an intense period of adjustment as they juggled their new course load with (usually) full time employment and their other responsibilities. The teaching team felt that discussing time management with new students would be better than interfering with the valued evidence base the portfolio was providing. Therefore, the instructions for 'one portfolio entry per week' were left unchanged.

Despite the impact of time-constraints on the portfolio, particularly pronounced during times of high academic workload for the participants, most had engaged well with the task early in the semester and found they paid it less attention only once other assessment tasks became a priority. While attention to it also dwindled because no 'marks' were attached, it was nonetheless a barrier to undertaking a clinical practice subject in the following semester; thus, all the participants handed in a completed portfolio, as did all students in their cohort. As discussed in chapter 2, the literature tells us that students are reluctant to invest time in an assessment task that does not 'count', as they see it. As Biggs and Tang (2011) put it: 'The existence of assessment keeps class attendance high and set references read' (p. 195). Portfolios from four students in the cohort were found inadequate. One research participant was in this category, thus, in this regard, the focus groups can be considered representative of the cohort. The teaching team discussed allocating 'marks' for the first portfolio

submission to encourage greater effort on the portfolio at these peak times; however, a strong consensus prevailed towards keeping it formative in this early stage of the course. Given the portfolios are very individual pieces of work (say, as compared to an assignment topic), the current system of allowing the few that were not satisfactory to be rectified and resubmitted, with feedback and assistance from the academic staff, was preferable.

The participants' feedback on what worked well for them with the portfolio emphasised the tasks ability to demonstrate their early achievements. For these people, new not only to the course, but to the profession and the practice of sonography, recording evidence of participation in the practice of 'scanning' as a means to demonstrate early skills and the beginning of confidence, was very important. The design feature felt to contribute most to this was the requirement for continuous engagement; having to collect an instance of portfolio evidence each week, research its significance, reflect on knowledge and skills still to be gained, and articulate its importance to learning in the act of writing it up. Over time, this built up an evidence base of achievements the participants felt important. An example is provided below, which is the Table of Contents from one participants' portfolio that demonstrates the range of ultrasound studies she has built up over the semester. It identifies that she is working primarily in an obstetrics and gynaecological practice but that she has also tried to extend her portfolio by including other general ultrasounds:

Contents

Week 1   Endometrial Polyp

Week 2   Ovarian Follicular Cyst

Week 3   Endometrioma

Week 4   Complex Ovarian Mass

Week 5   Physiological Herniation of the Gut

Week 6   Increased Nuchal Translucency

Week 7   Intracardiac Echogenic Focus

Week 8   Feotal Pyelectasis

Week 9   Thyroglossal Duct Cyst

Week 10   Ulcerated Carotid Plaque

Week 11   Polyhydramnios

Week 12   Submucosal Leiomyoma

Week 13   Ultrasound Approaches in Cervical Shortening and Funnelling

Figure 4 Table of Contents from Portfolio showing Evidence Base

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Table 3 provides a summary of the themes that developed from the research participants' responses to undertaking the original portfolio task. It includes the design changes implemented to both the task and the supporting resources in response.

Table 3 – Iteration 1: Summary of research findings and the design changes implemented in response

Themes	Response
Induction: Instructions	Improved written advice
Induction: Exemplars	Tutorial time for 'portfolio task' extended with an experiential learning task on creating portfolio entries, providing students with 'exemplars' of their own creation
Induction: Reflection	Discussed if raised by students in the experiential learning task debriefing
Time constraints and formative assessment	The requirement for one entry per week remained unchanged, as did the formative nature of the assessment at the novice stage
Demonstrating achievement	Requirement for one portfolio entry per week remained unchanged

The responses to the written guidelines in the table above were implemented in the study guides for all Clinical Practice subjects for subsequent semesters. The newly designed portfolio tutorial was implemented for the subsequent year, for all new students, which included the new research volunteers (drawn from the 2011 student cohort) (see Table 2 for research schedule).

Evaluation of Iteration 1

The local impact evaluation phase in Bannan-Ritland's framework assesses how well the intervention satisfies its clients, in this case, the student participants, and how the formative evaluation interacts with local theory development (p. 23). The theoretical understandings developed by the teachers as to how to respond to the participants' feedback from the original task were tested with participants from a subsequent novice cohort (novice

participants, fg 4). Although this is jumping ahead a little, inclusion of this subsequent novice groups' responses to the themes identified enabled evaluation of the changes implemented in response to the concerns of the first novice cohort by a novice cohort.

Interestingly, this new group of novice participants (8 students in the focus group, 4 interviews and 8 portfolios) still asked for clearer and more detailed instructions, despite interacting with the enhanced portfolio instructions and participating in the newly developed experiential tutorial based on creating their own exemplar portfolio entries. The majority of participants found the tutorial useful, however, a number requested exemplars that were 'perfect', rather than those they had created themselves. Despite this, there was an overall reduced focus on these induction issues among the second cohort as compared to the first cohort.

Once again, participants noted that other assessment tasks affected the time they devoted to the portfolio during periods of high assessment workload, however, for this cohort this was not as emotive an issue and some process questions were asked and answered about the possibility of writing up two cases from one week and none the next while they concentrated on another task, with the teachers encouraging this flexibility to a point. The use of reflection as a tool was raised only in the context of the portfolio tutorial session debriefing, and a brief discussion with the tutor resolved a few questions around it.

The importance to the participants of using of the portfolio to 'prove' practice in scanning and early achievements was again strongly evident, with one participant commenting that the requirement of the portfolio entries enabled her to put pressure on her employer to receive the training hours she had been promised. As little significant new information was garnered from this group, and as the portfolio had changed quite

significantly by the time of the third iteration, no further novice participants were recruited.

The participants from cohort 1 were also able to evaluate the changes based on their feedback in the following semester of their program. However, as they were now intermediate participants with more experience in their studies and in their clinical practice, this is reported in the next chapter, under iteration 2.

Evaluation: Iteration 1 - Broader Impact

The broader impact evaluation phase in Bannan-Ritland's (2003) framework directs attention to concerns relating to the adoption and adaptation of 'researched practices and interventions' (p. 23). This first iteration identified two portfolio practices of concern in the existing task: that of introducing a quite complex assessment task to complete novices at the very start of their program, and that of the portfolio's value in engaging the participants in learning and providing a vehicle to begin collecting a body of work for evidence of accomplishments.

In this first iteration a major concern was to identify and retain the feature(s) of the portfolio that were working well. In this respect, the participants identified the portfolio's value in providing evidence of their achievement (albeit at novice level); that is, its use in collecting, demonstrating and articulating evidence of achievement through the requirement for continuous weekly engagement throughout the semester. Staff also identified this continuous engagement as a valuable feature. Further research into student engagement ensued to identify literature and findings from other projects, to be added in an informed manner, as discussed next.

Student engagement

The notion of student engagement has gained a prominent place in higher education, with universities implementing surveys in an attempt to measure and increase students' engagement in their study programs. The basic premise is that the more a student's time is occupied with the practice of learning, the better the outcome. 'Student engagement' has come to cover notions of attendance, attention and motivation, as well as psychological investment. Tracing the development of research into student engagement, Axelson and Flick (2010) hold that the current understanding of engagement, while complex, 'has come to refer to how involved or interested students appear to be in their learning and how connected they are to their classes, their institutions, and each other' (p. 38). The first national survey instrument, the National Survey of Student Engagement (NSSE), was developed in the United States, and has since been adapted for use in Australia, as the Australian Survey of Student Engagement (AUSSE). These instruments collect information on 'students' involvement in activities and conditions that are linked with high-quality learning' (http://www.acer.edu.au/ausse/background).

One of the longstanding aims of portfolios has been to engage students in the broad sense, to capture their attention with continuous learning, not only of the content material but also for reflection on their learning and performance. Reports on portfolios have long demonstrated this engagement, for example, Black & Wiliam's (1998) pivotal study of formative assessment draws attention to:

> the innovators' enthusiasm, both for the power of portfolios to focus student attention on their own learning efforts and accomplishments, and for the evidence that teachers believe the work changes the ways in which they teach and increases their expectations for their students' (Black & Wiliam, 1998, pp. 45, citing Daro, 1996).

Tiwari and Tang (2003) provide a similar example in their interviews of nursing students, finding they favoured the use of portfolio assessment, and engaged in 'spontaneous collaborative learning' (p. 273). Students formed their own learning groups, and said they would choose a portfolio assessment again, even though it meant extra work.

Tochel et al.'s (2009) review of portfolios in postgraduate studies interestingly contains two sections entitled 'Engagement with Learning' (pp. 311, 313). In the first, outcomes of portfolio use are reported, with positive findings from the postgraduate studies they examined; for example, 'In Mathers, Challis, Howe et al. (1999), portfolio users were found to tackle a much wider breadth of learning activities and study topics' (Tochel et al., 2009, p. 311). In the second, discussing the outcomes of ePortfolio use, these authors say 'the engagement of both the student and the tutor … showed that the portfolio was … a dynamic account of learning, reflection and supervision' (p. 313). This iteration thus adds evidence to the theory that portfolios are effective because they promote student engagement. The participants in cohort 1 will further evaluate this in their role as intermediate participants (see chapter 5, iteration 2).

Induction to portfolio assessment

The participants reported finding the portfolio challenging at first, with many resorting to using, as exemplars, portfolios from colleagues that had previously passed through the program (some of doubtful applicability). They also asked for better guidelines and examples. The teaching team understood this as signaling a need for better induction, and responded by clarifying and improving the written directions for the task, and adding support in the form of a scenario-based tutorial. In this tutorial, students were assisted to create, two scenario-based portfolio entries for themselves to use as a template for their first few entries. Van Tartwijk et al. (2007) discuss factors in the successful introduction of portfolios, pointing out that the goals of the portfolio must be considered for it to be successful. The

teaching team was alerted to the need to consider and articulate what goals were specifically being targeted for the portfolio assessment, as this had not been addressed since the task's inception. Van Tartwijk et al. (2007) emphasise the importance of the match between the type of learning environment and the goals for the portfolio, and would consider the environment this research takes place in as:

> competence-oriented … [in which] competence refers to the ability
> to perform certain tasks in often hectic and complex day-to-day
> work settings, and this requires successful integration of
> knowledge, skills, attitudes, and personal characteristics …
> [which] are performed in different contexts [i.e. learning
> environments] that vary in nature and difficulty (p. 73).

They give the example of student teachers gaining competence by learning to teach in everyday classrooms, the context of which can vary enormously. In asking how a portfolio can be 'critically scrutinised to establish its suitability', they provide an illustration of a portfolio in different positions in accordance with its principal objectives' (see Fig 4).
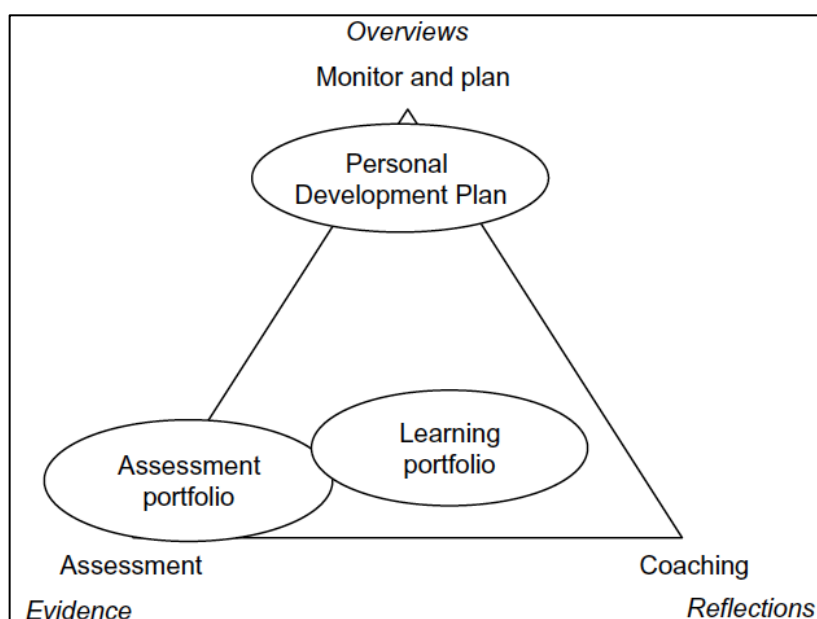
Figure 5 Purpose and Content of Portfolios
(Van Tartwijk et al., 2007, p. 72).

The participant's feedback on the need for better induction into the task encouraged the teaching team to look at the factors in successful introduction of portfolios, and allowed them to become 'sensitised to the importance of 'theoretical understandings' (McKenny & Reeves, 2012, p. 35), which led to further consideration of the goals of the task.

The broader impact of this first iteration at the local level consisted of theoretical understandings of the importance of portfolios to provide early evidence of achievement for students, and the need for a comprehensive induction to a complex assessment task. In addition, teachers were sensitised to the conceptual work required to map an assessment task against program goals for best outcomes, and included the goals for the task in the portfolio information. These 'local theory' building blocks can create 'specific design principles derived from abstraction of empirical findings from a limited range of contexts and contain the rationale behind the design of a specific feature of an intervention' (McKenney & Reeves, 2012, p. 36), which can build into 'middle-range' and 'high-level' theory in educational design research. This point will be revisited at the end of each subsequent iteration.

Conclusion

This chapter discussed the evaluation of an existing portfolio task, to provide a baseline for changes made in subsequent iterations and to identify and ensure those features considered valuable were retained and critiqued. This first iteration showed that participants found the portfolio assessment beneficial for its ability to engage them continuously in learning through the required weekly entries. It also allowed them to build an evidence base of their early achievements and see how far they had progressed, and even to leverage on the task to negotiate access to increased training. Based on participant feedback, improvements were made to the guidelines and an early introductory tutorial session was developed dedicated to inducting

students in portfolio assessment. This tutorial not only provided information and discussion of how to approach the task, but also offered the opportunity to practice compiling a portfolio entry using case study scenarios.

As detailed in the next chapter, but reported briefly above, the novice participants from the first student cohort who provided the feedback upon which the changes were made evaluated the redesigned portfolio as intermediate participants in the second iteration. A second cohort of novice participants also evaluated the changes 'from scratch', and while they raised similar issues under the same themes as the first cohort, there was an overall reduced emphasis on all issues, and less emotive comment for some components compared to the first group. The teaching team and the researcher interpreted this as a successful redesign to the participants' induction to the portfolio.

The first iteration has provided some 'local theory' building blocks within the educational design research method being used, which will be built upon in the next chapter.

Chapter 5 Second Iteration

Introduction

This chapter describes the second iteration of the portfolio, the main aim of which is to introduce new portfolio tasks aimed at facilitating students' independent learning, judgment and reflection. This work builds on that started in the previous chapter in which the existing portfolio assessment was studied through participant feedback. Its perceived benefits (encouraging student engagement and as a vehicle for demonstrating achievement) were evaluated and retained, while changes were made to enhance those areas requiring improvement (induction processes and time management of assessment tasks; see Table 3, Chapter 4) were evaluated and retained, while changes were made to enhance those areas requiring improvement. The effects of those changes will be evaluated in this chapter, while chapter 6 will cover the third iteration, which again involves the addition of new design elements, though this time aimed at more experienced students.

The iterative process is an important aspect of both the educational design research approach being taken in building this portfolio for longer-term learning, and of the introduction of assessment tasks more generally in higher education, as explained in chapter 3. Assessment tasks in particular require iterative evaluation, as they are notoriously difficult to design well and to introduce into practice. This iteration of the task is aimed at introducing longer-term learning skills and to contribute to theory through evaluation of successes and failures in design.

To this point then, the participants' evaluation of the original portfolio determined the most valued aspect of the portfolio to be 'demonstrating achievement'. This was attributed to the fact it was the only task the novice students had encountered which engaged them on a weekly basis in

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connecting theory with practice. That is, it provided continuous engagement in learning. In addition, it built an evidential base of their early achievements, which they felt particularly important as it provided a sense of 'getting somewhere' during the difficult early stage of getting to know a new discipline. These valuable features of the design were thus retained through the continued requirement of weekly entries, although some flexibility was built into the instructions; for example, the portfolio briefing session included a discussion with students that they might enter two interesting cases in one week and none the next, to enable students to manage the portfolio requirements once other assessments put pressure on available time. The other revisions to design features included improved induction to the portfolio, with improved written instructions and enhanced support for participants undertaking the portfolio for the first time. Additionally, a tutorial was designed solely around introducing the portfolio assessment, which involved students creating their own exemplars to use as a template for their early entries. The first part of this chapter thus presents participants' feedback to these new revisions, while the second part discusses those tasks introduced in order to foster independent learning, judgment and reflection.

The research supporting each of the new inclusions in the portfolio has been discussed in chapter 2, and the argument made for the importance of helping students understand and develop their independent learning skills, gain experience critiquing their professional judgments and building the capacity to judge the quality of their work. Each of these elements was introduced into the portfolio as a separate task, and each is described below.

This iteration, and each added skill, will be again explored using an educational design-based research approach. As in the first iteration, the 'informed exploration' and 'enactment phases' (Bannan-Ritland & Baek, 2008), which cover the literature and theories to be adopted, were discussed in chapters 2 and 3. The remaining two phases: 'Evaluation: Local Impact'

and 'Evaluation: Broader Impact' are again given separate discussions here. In these, results and consequences are evaluated in terms of theoretical understandings in the particular cohort being investigated (local) and in the ideas developed (more broadly).

Iteration 2 - Description

This description starts with the response of the first novice cohort to the changes made based on their feedback. They are now called the 'intermediate' participants as they have progressed in their course and are towards the end of their second semester. These changes are integrated into the 'Clinical Practice' unit of study guides they received at the start of the semester. The 'evaluation' section in chapter 4 described the response of novice participants from the *second* cohort of students to the revised instructions and portfolio tutorial, while the response of the intermediate participants to the same changes is reported in this chapter due to the different nature of responses from these more experienced participants. In addition, the major change to this second iteration is the inclusion of the three new design elements added to encourage longer-term learning. The remainder of this chapter describes each of these elements, and the participants' response to each of them, through Focus Group 3 and individual interviews.

Most of the participants evaluating the second iteration were the 'intermediate level' participants, a little under half-way through their course, and most participated in the focus groups reported under the 'First Iteration' in chapter 4. They were therefore more experienced in both their university program and their clinical practice. Their portfolios had been assessed both formatively, after 12 weeks in the course, and summatively in the subsequent 'clinical education' subjects in their program. All participants now came together as Focus Group 3 during the second semester of their first year at an on-campus attendance. Again, individual

interviews were held at the end of semester that contributed to iteration 2; however, the gap between the focus group and the interviews was greater than for iteration 1 (9 weeks rather than 4 weeks). Because of this gap, and due to the primary interest of this iteration being the addition of the new learning skills to the portfolio, the focus group evaluated both the changes based on iteration 1 and the new portfolio entries, whilst the interviews concentrated primarily on the interventions. Thus, in the discussion below, focus group feedback is primarily reported for the changes based on iteration 1, while interview data are reported primarily where the new interventions were discussed.

The researcher reminded Focus Group 3 (8 students) that participation was completely voluntary and they were free to leave at any time and it was completely fine. The researcher said:

> So today, we are going to talk again about the professional practice portfolio and your experience with it, and how you went about doing it and what you think about it, and maybe how your approach to it has changed over time (fg 3, researcher).

A lively discussion ensued with these participants, who were no longer overwhelmed by the newness of their course, and who had developed relationships with the staff members, allowing them to speak quite freely. The two issues previously identified, 1) induction to the portfolio, encompassing themes of 'guidelines', 'time constraints' and 'grades' and 2) evidence of achievement, are discussed below. Following this, two new concerns to emerge for these students, 1) consistency of assessors and 2) selection of portfolio content, are also discussed. Thirdly, in the section 'Adding features for longer-term learning', discussion focusses on each of the new pedagogical strategies.

Portfolio induction

As mentioned above, these participants now had enhanced guidelines to follow based on the feedback they had provided earlier, and given their experience, completing the task had become much less problematic, drawing far fewer comments in the focus group. Some examples are seen in the comments:

> … early on I found it a bit hard to start and hard to know how to lay it out … the example at the start was ok but when you have to do it yourself… (it's harder) … it's ok now.

And

> … it's useful to start like at the beginning … like when we start scanning for abdomen … when every single pathology you are not sure about …(fg 3, intermediate participants).

Both participants, as can be seen from their comments, reflected on when they first started, and both went on to conclude they had fewer issues now. Some concerns were again expressed that times of high assessment workload impinged on their ability to do the portfolio well, but these were much less of an issue now, possibly as they were more attuned to managing the workload than they had been when they started the course. In addition, the lack of a 'grade' being given for the portfolio task caused it to be neglected when the pressures of other assessment tasks impacted. As the portfolio now 'counted' towards a grade, this was not the issue it had been earlier and was not raised in the focus group or interviews.

Demonstrating achievement

The importance of the portfolio as evidence of achievement was again strongly voiced. Relative to their novice selves with minimal practical experience, they had moved on from simple achievements such as confidence in 'finding a stone in the gallbladder' (fg 3, novice participant) to recognising greater complexity in some areas. Indicative of the range of comments expressing this was:

… when you have a really interesting case and you don't have a
diagnosis or it's really complex … [it's good that] … you've got to
learn and research … like I work in fetal and maternal medicine
so you have really interesting things …[to put in the portfolio] …
and it shows what you can do …(fg 3, intermediate participant).

Whilst this participant also commented on the fact that in her opinion, more
complex cases are better suited to the 'Case Study' format which has a
greater word length than a portfolio entry, her appreciation of being able to
document achievement by writing up 'interesting' cases is clear. The
researcher and the other members of the teaching team felt that a number
of comments expressing these thoughts justified the decision to retain the
weekly portfolio requirements.

Reflection

In the first iteration, some participants commented that they had assumed
the portfolio assessment was similar to the reflective journals they were
familiar with from their undergraduate studies. When the teaching team
discussed this, they decided, at that point in time, not to add anything
specific in the way of teaching of reflection, as it had already been planned
as an inclusion for this iteration, but instead to clarify student concerns
should the issue be raised. No comments were made by Focus Group 3 or
the intermediate interviewees that were independent of the prompting of
the researcher regarding the new 'Reflection' portfolio entry. Consequently,
discussion of reflection comes later in this chapter under the new design
features.

Iteration 2 – Findings – New Themes

The audio recording of Focus Group 3 was carefully transcribed by the
researcher and analysed as for iteration 1 with the help of data
management software. Coding of emergent themes was undertaken and

interpretations formulated. The themes identified previously have been discussed above. In the analysis, however, two new significant themes emerged:

1)   Assessment consistency – the focus group participants raised concerns over the different marking styles of different assessors.

2)   Selection of Content – this referred to recurring comments around the content focus of portfolio entries selected.

Each is discussed below.

Assessment consistency

One new concern to emerge centred on issues around the consistency of assessors in marking the portfolio entries, as some participants had experienced more than one assessor at this stage. This issue had not arisen in iteration 1, as the participants had only had a single formative assessment at that point by the university staff. Subsequently, both university staff and university-appointed workplace supervisors had variously assessed their portfolios. Whilst in the (arguably) ideal situation a participant would have one consistent university staff member assessing them across their program, and one workplace supervisor assessing their progress consistently in their clinical setting, this was not always possible. Potentially, the intermediate participants could have had up to four assessors at this point in their course. Participants commented they had experienced different opinions of their work from different assessors, with a typical comment saying:

> I found it was yeah … trial and error … 'cause I had three
> different examiners and each person obviously marks them
> differently … so I just sort of learnt as I went on how I was
> supposed to actually write it (fg 3, intermediate participant).

Another commented:

… at the beginning, I was told I wrote too much and then the next assessor said, 'You wrote too little' (laughs) and then the third one was now happy and yeah … (fg 3, intermediate).

No animosity was apparent in the tone of either of these comments, however, and another student suggested calmly that this was a normal state of affairs:

… one (assessor) said 'too technical' … the other 'not too technical' … but you have to change it all the time … *it depends on who you are doing it for* … even when you do it for whoever you work for (it's the same) (fg 3, intermediate participant, italics added).

The acceptance of this issue may reflect the maturity of the postgraduate student; however, while there were nods of agreement with the comment 'it depends on who you are doing it for', there were also mutterings of discontent following this exchange, with some participants feeling that the marking of their portfolios should have been consistent. The researcher, as one of their lecturers, acknowledged the issue and agreed to investigate options further, but moved the questioning along to another topic, in order to return to the research questions. Attempts to respond to this issue are discussed below.

Selection of content

A second new theme to emerge evolved around the participants' selection of the content for the portfolio, perceived as limited to two topics, 'pathology' or 'physics'. This group had now completed approximately 25-30 of the weekly entries in their portfolios, so had quite a collection of content. Much discussion was devoted to writing up cases of 'pathology', with many students perceiving it as the easier strategy for a portfolio entry:

… you tend to pick pathology 'cause it's easy to write up as opposed to picking something technical (physics) because it's harder to write up … I think you end up getting a format so you

end up writing the same format for every case … well … not every

case but … plus I think you tend to focus more on

pathology 'cause it's easier to write about … and you learn

something from it (fg 3, intermediate participant).

There was general agreement with this statement, and on further questioning, most participants had almost 100% of their entries based on normal anatomical and pathological findings, not only because it was 'easier', but also because it was of most interest to them. When the concept of including some physics entries was raised by the researcher, the comment was made:

I don't think about it (finding cases for the portfolio) while I am

doing the scan, but at the end of the day, I think 'oh that's right, I

have to do my portfolio … I had a patient with blah' … and I go

into the machine and I print off the pictures. I *don't* think while I

am scanning … 'oh there's an artefact, I'll print that – now fix the

artefact – now print that' – no … so it's hard to get artefacts (fg 3,

intermediate participant).

But another participant responded: 'it would be good to have a good example … of … an artefact one' (fg 3, intermediate participant).

Since there were no stipulations as to the particular content in the portfolio instructions, the potential to encourage a more balanced mix of pathology and physics as well as encouraging a diversity of related experiences, for example, ethical dilemmas and occupational health and safety issues, was felt by the researcher to be important and needed to be encouraged in the portfolio tasks. This was raised with the teaching team meeting and is discussed further in the evaluation section below.

Thus the themes of concern that participants raised regarding the original portfolio task, iteration 1, were reviewed and evaluated and led to some reasonable but fairly minor ongoing enhancements in portfolio design and

practices as discussed above. Notably, the review identified continuous engagement with the portfolio task at weekly intervals as the feature that should remain intact. Two new themes, raised by the intermediate participants now that they were more familiar with the program and the process of building portfolio entries, were the consistency of assessment of portfolios and the selection of content. The evaluation of these new themes is further discussed in the next section.

Evaluation: Local Impact – New themes

The local impact phase of the intervention is 'essential … for uncovering the local validity of the enacted theoretical model or design and the usability or fit of the innovation for the context' (Bannan-Ritland & Baek, 2008, p. 310). The discussion thus far has evaluated the enacted changes of iteration 1 on the participants on whose feedback the changes had been made. The solutions suited the local context and would be retained into further iterations of the portfolio. Two further themes arose now that the participants had moved on in their course: the consistency of assessors, and the selection of portfolio content; both local issues but nonetheless important as they raised significant awareness of features that could greatly enhance the portfolio's effectiveness. The researcher fed back these issues to the teaching team for discussion and the issues and outcomes for each are explained below.

When raising concerns about the consistency of assessors, one of the team suggested, 'it wasn't that hard because you just go back and look at what was said before.' This led to a discussion of how much feedback was given by assessors, who felt they wrote a considerable amount to guide students, but had never considered that other assessors may use it. Some felt it depended upon how much time they had to go back and investigate – others limited their time to that available in within the 3 hour long clinical visit, because the portfolios were too bulky to take home/back to the university. To

improve this aspect of the portfolio, an item 'consistency in assessing' was added to the agenda for discussion at the following clinical supervisors meeting – an annual meeting for clinical supervisors hosted by the university staff – with the idea that the guidelines to the assessors could then be revised to remind them to review previous feedback the students had received, in an attempt to achieve greater consistency in marking. It was decided that a short presentation by the researcher on the importance of feedback would be delivered, followed by the opportunity for open discussion.

The issue of feedback in university studies has attracted much attention in recent years, driven primarily by students consistently reporting it as one of the least satisfactory aspects of their university experience (Boud & Molloy, 2012). Students, as 'conscientious consumers', have been shown to intrinsically value feedback and make attempts to use it to improve future work (Higgins, Hartley, & Skelton, 2001). Portfolios can provide a key component for managing feedback. Their ongoing nature can facilitate feedback monitoring, collating feedback comments and providing a record of action taken as a result, its success, or whether further intervention is required. For both assessors and students, ready access to prior feedback comments (their own and those of others) is valuable to assess progress. Portfolio tasks may also be designed to encourage students' efforts to elicit their own feedback (from peers, supervisors and self-assessment from previous episodes) and thus assist their progress in managing their own learning. Duque et al. (2006), for example, found portfolio feedback '… tracks student progress in skill acquisition and stimulates student-tutor interaction with a high level of acceptance' (p. 7). Situating student self-management as central to feedback, Carless et al. (2011) find 'multistage' assignments such as portfolios '… facilitate sustainable feedback when … processes support students in self-monitoring their work while it is being developed' (p. 398). Portfolios can thus facilitate feedback and place

students as active participants in the management of feedback, encouraging both students and teachers to close the feedback loop.

The presentation on feedback issues at the supervisors' meeting generated good discussion between the university staff and the supervisors (five staff and approximately 25 supervisors). In a routine clinical assessment, the supervisors' primary job is to observe the student in practice, but they are also asked to try to allow half an hour to go through the portfolio with the student within the three-hour timeframe of an assessment. One supervisor commented that had they been the previous supervisor, they would have 'flicked back' in the portfolio to see what had been previously suggested, and determine how the student was progressing relative to that feedback. If they were not the previous supervisor however, 'that made it really tricky …' (Supervisors' meeting, workplace supervisor) and it was avoided. One or two workplace supervisors raised the issue of the increasing complexity of managing all the tasks required for clinical assessment but most were content to include this new idea and resolved to make greater efforts to document and review feedback from themselves and others in the future, thus embracing new supervisory skills. The discussion also led to awareness of allowing students to be more active agents in managing feedback, and the third portfolio iteration, which is next assessed, explores this aspect.

Selection of content
The teaching team engaged in much discussion of this topic. The idea that the portfolio should cover many areas was initially received enthusiastically; however, as the discussion progressed, the view that mandatory entries were already being imposed was raised, which in turn left less scope for the student to add what they were learning that was important to them. As discussed in iteration 1, the literature supports that it is important to leave portfolio content flexible, as it should reflect aspects that the participants find interesting in their own practice, rather than introducing the burden of having to find experiences outside of their current

scope. Nonetheless, the concept of encouraging some 'physics' content was felt to be important. It was suggested that one way this could be implemented was during the experiential portfolio tutorial developed following iteration 1, and it was revised to include an exemplar of a 'physics' entry. In addition, the tutorial debriefing would include a discussion of alternate topics they might encounter in practice, which could make a good portfolio entry to help round out their learning.

So, two new themes identified by the participants, consistency of assessors and selection of content, resulted in changes as identified in Table 4 (see p. 132) to be incorporated into the next iteration. The major purpose of iteration 2, however, was the addition of design features for longer-term learning, which are discussed next.

Design Interventions for Longer-term Learning

The key objective of this iteration is to add learning strategies that promote continued learning into qualified practice, which, as argued in chapter 2, must surely be a major aim of higher education. This was achieved by embedding three specific pedagogical strategies in the portfolio task: independent learning, judgment making and reflective practice. Participants were asked to include, at any point in the weekly entries of the semester, one entry that demonstrated evidence of each of three new features:

1. An incident that showed evidence of independent learning
2. An event demonstrating a judgment made in practice
3. A reflection on a previous case and its implications for future learning.

The instructions included:

> … (three) weeks should be set aside to demonstrate reflection and longer-term learning (approx. 1 page). (Clinical Practice

Information, Unit of Study Guides, Graduate Sonography
Program, 2011).

The implementation and evaluation of each of these is discussed in turn
below. At this point, the research data included the discussions of Focus
Group 3 (8 students), interviews of four participants, and eight portfolios
with entries for each of the elements, which were analysed by the researcher
after they had been marked by university staff for that semester. Portfolio
entries added valuable data to complement the verbal opinions of
participants. In the following discussion, where quotations are taken from
portfolio entries, these are indicated as 'pf', and as in the last iteration, the
level of participant follows this: novice, intermediate, advanced or graduate.
For example, a portfolio quotation from an intermediate participant will
appear as:

> 'quotation' (pf, intermediate participant).

Independent learning

As identified in chapter 2, the capacity for independent learning is a
necessary component for ongoing development in professional practice. Even
prior to the intervention, evidence that participants were learning
independently in practice was abundant throughout the data collection, in
focus groups, interviews and portfolios, and at all levels of experience;
novice, intermediate and advanced. The participants were postgraduate
level students, who are generally expected to be independent in their
learning, with a significant level of concurrent clinical practice experience.
This meant they were exposed to many learning opportunities not formally
encountered in their university studies. In one novice portfolio, for example,
the participant stated:

> A quick literature review was undertaken to assess current
> opinion on the significance of (a particular pathology) … I have
> learnt there remains mixed opinions on the significance … As a
> sonographer I should certainly document the existence of (it) and

perhaps give increased attention to my scanning of (that area) …
(pf, novice participant).

This participant also indicated she had sought the advice of colleagues after she had investigated the literature on that particular pathology. This indicates a high level of independent learning despite a very early level of experience in the field and not having yet encountered the theoretical knowledge in the course.

What the design intervention aimed to do, however, was to provide an opportunity for participants to experience and practise independent learning in a formal way, and raise their awareness of the need to extend this to the future learning they would need to continue to practise, and for mandatory requirements such as they would need for documenting continuing education. The new instructions asked participants to include in their portfolio at least one example of independent learning:

Independent Learning – include an example where you have had to prepare for a new application/procedure/scan type by proactively preparing your knowledge. Include a discussion of the resources (people, texts, articles, searches) you employed to achieve the learning and whether these were adequate/inadequate on the first attempt. If inadequate, what could you do in the future to better prepare? This example may or may not include an image. Having considered this carefully, write a paragraph discussing the conclusions you have come to about independent learning that you can take forward … to prepare for new areas of learning. (Clinical Practice – Professional Portfolio Guidelines, 2011).

Evaluation of the 'Independent Learning' portfolio entries, and investigation of the idea of independent learning in interviews, showed excellent uptake of the idea. One portfolio entry, typical of many, recorded:

'I (had) picked up a lot of jargon on the pathology; however, I did not know the actual anatomy … this in turn made me go to the textbooks to read up (she found websites *Ultrasoundpaedia* and *YouTube* useful in addition to textbooks) … therefore I started to look (for that pathology) … and started to find more and more …(in my practice)' (pf, intermediate participant).

The overwhelming theme to emerge from the participants, however, was not one of practice improvement per se, but the notion that learning independently led to gains in confidence. One participant, asked about writing up examples of independent learning in the portfolio, reflected a number of similar comments in an interview:

I think it gives you a bit of confidence, because you don't have to come running to your supervisor and bugging them or bugging a doctor … you can stand on your own two feet … you've researched it, you know what it is, and you can confidently say '*that's a* (certain pathology)' … that's what I think it's good for … that you can have that bit of confidence' (participant's italics) (int, novice participant).

In addition to the interviews, many participants' portfolio entries for the independent learning task also related to the theme of confidence. In this example from one portfolio, a participant indicated she had undertaken wide consultation over a problem, including with senior colleagues. The entry stated:

… scanning the palpable lump (showed a certain pathology with a particular technology) … this finding prompted me to question (what this) appearance was. … This was discussed with the senior sonographer, the reporting radiologist, and the following textbook (referenced) (pf, intermediate participant).

The participant had then used the text to construct a small table contrasting findings in two different pathologies, which she said would give her 'more confidence in this situation' (pf, intermediate participant).

The independent learning addition therefore was seen as an area already developed through their undergraduate studies, but which raised participants' awareness of its importance, and was found useful for building confidence. Further consideration of what 'confidence' entailed is given in the evaluation below. Such prompting to consider independent learning could be reinforced towards the end of the course to encourage the need to continue it into professional practice. The researcher and other teaching staff determined that students could be helped to see its value in developing confidence for future, not-yet encountered, learning needs. The researcher offered to include a session for the advanced participants near the end of the course to raise awareness of the need to make it ongoing. A section considering the theme of confidence is presented below.

Judgment

To enhance the portfolio for longer-term learning, a design element around the idea of learning to make sound clinical judgments was included. The instructions to the participants said:

> Judgment – include an example in which you have had to make a
> clinical judgment that you feel confident to make now, that you
> might not have been earlier in your studies. Describe the
> judgment made (may or may not include an image), the context
> and the processes you have undergone to be confident in your
> judgment. Judgment can be complex and this entry may refer to a
> scan/pathology/etc., or may refer to an encounter with a
> patient/colleague/radiologist/etc. Did your judgment involve any
> ethical decisions? Explain briefly your conclusions about making
> clinical judgments and write a final paragraph about how you will

take this forward into your practice (Clinical Practice –
Professional Portfolio Guidelines, 2011).

Evaluating the portfolio entries on judgment and analysing the information
from the focus group and interviews revealed this to be an area dependent
upon context and experience. Participants almost exclusively used the
'judgment' entry of the portfolio to talk about an area of practice they were
most experienced in. The more experience, the more confident their entries.
An example of a very tentative entry from an intermediate participant is
seen below. It is probably tentative because although she was 'intermediate'
level in her course, she had only recently commenced one of the content
areas, that of obstetric ultrasound. She thus had a 'novice' level of
experience in this particular content area. Her portfolio entry read:

> When I first started performing (obstetric) ultrasounds … I felt
> quite uneasy about all the things that needed to be assessed even
> though I had been observing my seniors and knew the images I
> needed to obtain. … When I came to the (area with an
> abnormality) this was when an alarm bell went off. … After
> completing the scan, as much as I was confident that I got (it)
> correct, and believed it was true … and not larger due to my lack
> of experience, because I'm a trainee I alerted my senior to double
> check. … (further details on the pathology). Therefore in this scan,
> I believe that I was competent enough to scan on my own and
> recognise a structural abnormality; however, due to the fact that I
> am a student, reassurance by a senior is a must. However when I
> am fully qualified, I will still do the same due to the fact that
> (second) opinions don't hurt and it reinforces your findings to be
> correct (pf, intermediate participant).

A participant who was more confident due to more experience in a
particular area described performing a particular procedure sufficiently
often to have developed her own 'list' of indicators for pathology. She writes
in her portfolio entry:

An example in which I had to make a clinical judgment … (while) … performing the procedure is concluding whether a fallopian tube is blocked (non-patent). After observing numerous … examinations during my early training period and now performing the procedure unaided … I feel more confident. Although diagnosing a blocked tube remains difficult in some situations … the following processes have allowed me to be confident in my judgment (pf, intermediate participant).

This was followed by four bullet points, each with one to two sentences describing particularities of the study that were indicative of the pathology in her experience, beyond what is documented in textbooks.

A more complex overview of experience being crucial to judgment may be seen in one of the graduate interviews. This was in the final iteration; however, it is included here as it is a good example of this student developing a broader definition of judgment about entire examinations, rather than just a particular context or pathology as seen above. In her interview, this student describes making a judgment that she had performed the best examination possible:

… yeah, it's that feeling that you've seen everything well, and knowing that no one else could have seen it better … you just think, 'Well, I'm not that confident, I know I could have missed something, but I don't think that anyone else, with this machine, and with this patient, could have got that much better or enough to see something that I didn't see' … (int, graduate participant).

Thus, the participants' portfolio entries demonstrating 'judgment' and their interview responses to questions asking about instances in which they had exercised judgment showed that their ideas developed with experience. Starting with incremental steps in isolated incidents and developing to more holistic notions, judgment was closely related to the experience they had

gained in that particular area. The notion of experience is discussed further in the evaluation section below. The participants show, through their comments and portfolio entries, that the importance of continuing to develop the capacity for making, reviewing and evaluating clinical judgments into their professional careers was encouraged by the portfolio requirement. The idea of a debriefing session about this task to reinforce awareness of its ongoing importance is discussed below in the local impact section.

Reflection

Facilitating students' reflective practice in tertiary courses has been shown to be essential for developing reflective practitioners, but at the same time can be fraught with difficulty, as discussed in chapter 2. In Focus Group 1 of the first iteration of the portfolio, the participants raised reflection without prompting. They drew comparisons between the portfolio and their prior experience of reflective journals with very mixed feelings. In the initial discussions of the redesign of the portfolio for longer-term learning strategies, with the idea of 'teaching' reflection by the teaching team, it was decided to introduce reflection as a longer-term learning skill once the students had some experience and had a reasonable collection of portfolio entries to reflect back upon.

The intermediate students evaluated the second iteration, so the opportunity to ask them to look back at earlier portfolio entries was available. The instructions were amended, therefore, for all students other than beginning students, to include an entry demonstrating reflection. This read:

> Reflection – review your earlier portfolio entries and choose one which, upon reflection, you feel you could do much better at now. Think carefully about this case by recollecting the event and noticing the experience of doing the scan and writing it up. Really think about how you were feeling at the time (about performing this case) and contrast this with how would you feel now about

doing such a case. Write your final paragraph for this entry around what can you learn from this type of reflective thinking, that you can learn from and take forward into your (future) practice (Clinical Practice – Professional Portfolio Guidelines, 2011).

A range of interesting findings came from the analysis of the 'reflective' entries. Some participants reflected well on past entries, identifying how far they had come, but failed to show onward vision, that is, any notion of continuing this after it was required by the university. An example is one intermediate participant whose reflective entry starts out well, as she writes convincingly about improvements in her technique:

This is one of my earlier portfolio entries looking at a pancreatic lesion. Upon reflection I did not feel confident at the time imaging the pancreas … at the time I lacked confidence and had difficulty in decision making about the nature and location of lesions. At the time writing portfolio entries and researching the nature of pancreatic lesions helped me to better understand what I was looking at. … Now I feel I could do better in identifying the origin of lesions including looking for a 'claw sign'. I also now feel more confident identifying and imaging the pancreas. With more experience come (sic) a greater confidence with a greater knowledge of pathology and anatomy (pf, intermediate participant).

The last paragraph, however, which asks how this could be projected into future practice, is somewhat unconvincing:

This type a (sic) reflective thinking can help identify areas which need improvement and identify learning processes which are affective (sic) in helping to educate and progress scanning skills.
… I can take forward into my practice that further education and experience is beneficial (pf, intermediate participant).

Another participant was more confident about reflective practice beyond just obtaining the correct pictures:

> Another thing I found difficult … was diagnosing acute cholecystitis; due to my lack of experience and not really understanding what the positive Murphy's sign was and feeling sorry for the patient and not pushing to see where their real pain was … (I've now) learnt … to press down in three areas to see what point is the most sore region of interest … clinical and physical examination is what I learnt to be important alongside scanning when it comes to diagnosing … (pf, intermediate participant).

Perhaps the most comprehensive entry came from a participant who had had a little more experience than the previous two, having approximately six months more clinical training. Her discussion is comprehensive and articulates not just being able to obtain ultrasound images, but to learn about the use of the ultrasound equipment as only one of a number of means at her disposal in coming to a diagnosis. She writes:

> In review of the portfolio entries, I believe the case of week 7 could be performed much better if I were to be faced with a similar situation. As the case was my first encounter of a suspicious appearing lymph node, in my mind I was worried … this case demonstrated the importance of employing a methodical approach when conducting an ultrasound examination. … If I were to encounter a similar case, I believe I would be more confident in performing the examination … I have (also) learnt to include as much clinical history of the patient obtained.

And her last paragraph stated:

> From this reflective thinking, I have learnt that ultrasound is not exclusively about imaging the routine pretty pictures. Sonography is about understanding what is requested on the referral,

obtaining a thorough clinical history from the patient, scanning methodically, linking any findings back to the question asked on the referral, and documenting all the necessary information … to ensure an accurate diagnosis … (pf, intermediate participant).

The level of insight in this comment on the value of reflection clearly demonstrates its worth as an inclusion if managed carefully. One of the teaching team members commented, when this quote was highlighted, that she had been 'telling students that for years'. Thus, it was not difficult to persuade the team to continue with a 'Reflection Entry' in the portfolio into the future. Those members of the teaching team with familiarity in teaching reflection and working with reflective journals felt it would need more than just written instructions, and offered to contribute a formal tutorial at an appropriate time and ongoing support as needed. On discussion, the idea of progressive teaching assistance with the reflective portfolio entries resulted in the decision to hold a formal tutorial at the point where sufficient entries would make it a worthwhile exercise, and again towards the end of the program when attention could be drawn, and guidance given, as to the value of continuing with reflection into professional practice.

Surprisingly, the issue that caused the most consternation for the teaching team involved the logistics of asking for different portfolio elements from different levels of students, that is, putting different requirements into the study guides for different units of study depending on where they were found in the course. As it was not possible to ask beginning students to reflect back on prior portfolio entries, this meant that the instructions for beginning students had to be different from those of students later in the course. The 'original' task, evaluated in iteration 1, presented no such problem; the instructions for the portfolio in all the study guides were the same, independent of the stage of the students. The researcher eventually persuaded the group that for the new pedagogical practices to be effective, consideration had to be given as to whether the students were just

beginning, almost finished, or somewhere in between in their course. This was supported by the findings above, as all three interventions demonstrating increasing abilities tied to the participants' stage, and by the assertion that pedagogically, teachers need to be attuned to increasing challenges for students and providing feedback at more sophisticated levels over time. This led to the introduction of the concept of scaffolding of support for students' longer-term learning skills in further iterations, which is discussed in the 'Scaffolding' section below.

Evaluation: Local Impact – Design Interventions

Educational design research has been compared to 'a form of interventionist research that creates and evaluates novel conditions for learning … (which may provide) … new insights on the process of learning … (and) … differs from most educational research because they do not study what exists; they study what could be' (Schwartz et al., 2008, p. 47). The new design features introduced to the portfolio are a form of educational intervention, which provide a step or two in the direction of 'what could be'.

The three new categories of portfolio entry, independent learning, judgment and reflection, were evaluated independently for the research participants by the researcher, and for the rest of the students by the teaching team (as was also done in iteration 1). Following this, a team meeting was held to discuss the findings and any proposed changes to be taken into the next iteration. Each of the three new categories proved to be a successful inclusion, was well accepted and provided evidence of enhanced student thinking in that area. The teaching team was enthusiastic to continue with them and to provide the additional support as described above, for subsequent cohorts of students.

There was thus little revision required to the second iteration of the portfolio and the supports that had been put in place following iteration 1,

so the new design elements of independent learning, judgment and reflection would continue. A summary of the changes is shown below in Table 4.

At the end of the semester and following completion of all the assessment requirements, a further four participants were recruited by the researcher for semi-structured interviews, three of whom were the same as those interviewed for iteration 1. This allowed exploration of the emergent themes in greater depth and complemented the focus group data. Following the four participant interviews, no new information was gained, so no further participants were recruited. The audio recordings from the interviews were again entered and coded in the software.

Table 4 – Iteration 2: Summary of design changes implemented in response to final feedback on Iteration 1, and in response to the introduction of each of the new design elements

Feedback/Analysis	Response
Response to iteration 1	
Induction to Portfolio - Guidelines, time constraints and grades	Enhancements retained
Evidence of achievement	Enhancements retained
New themes raised in iteration 2	
Assessment consistency	Assessor guidelines revised, presentation and discussion of the importance of feedback at Supervisors meeting
Selection of content	Tutorial time for 'portfolio task' to include a 'physics/artefact' example, with other topics such as ethics or OH&S to be discussed in the debriefing
New design elements added to iteration 2	
Independent Learning	Accept change and continue to next iteration. Incorporate a discussion on independent learning towards the end of the course to show students it develops confidence and to encourage continued use after graduation
Judgment	Accept change and continue to next iteration. As for Independent Learning, discuss at the end of the course to encourage ongoing use.
Reflection	Accept change and continue to next iteration. Make the requirement for a reflective entry start at the intermediate level once there is a collection of portfolio entries. Provide a tutorial on the topic at this time and again towards the end of the program. Teaching staff experienced at facilitating reflective practice to provide ongoing support as needed and ensure it is well managed.

Evaluation – Iteration 2 - Broader Impact

The broader impact of iteration 2 is reported here. Participants were asked to include portfolio entries during the semester, one each that provided evidence of independent learning, a judgment made in practice, and a reflection on a previous case and its implications for future learning. Three solid themes emerged from the focus group, interviews and portfolio entries for each of these, summarised as confidence, experience and scaffolding support, and are discussed below.

Confidence

In the evaluation of the participants' portfolio 'independent learning' entries, where they responded to the direction to write about an incident where they had to proactively prepare their knowledge for an area not previously encountered, a recurring theme around 'confidence' arose. Preparing the portfolio entries required participants to research areas not previously encountered, so they had to make the connection between their research and their practice, which allowed them to 'confidently say '*that's* a [diagnosis of …]'.

In a critical review of the self-assessment literature, Eva & Regehr (2005) say of health professionals: '… having a clear and accurate sense of one's strengths allows the professional to act with appropriate confidence … with the confidence to move forward on a fitting plan of action without inappropriate hesitation or trepidation' (Eva & Regehr, 2005, p. S46). The strengths these intermediate participants had articulated were in those contexts where they had engaged in sufficient practice to allow their confidence to build, and with this confidence they provided evidence that they were able to move forward.

The instructions for the portfolio entry on independent learning requested that the participant provide a paragraph concluding what they now know

about independent learning, which they can take forward into their practice. The research showed the benefits of engaging in learning independently had led to gains in confidence which could be used to encourage motivation of students to continue this activity in their future practice.

Experience

Evaluating the portfolio entry that asked participants to discuss a clinical judgment they had made uncovered a strong link with notions of 'experience'. Participants reported 'lack of experience' and 'experience' in specific contexts as being a crucial factor in making good judgments. The analysis identified the emerging understanding for the researcher that judgment-making might well rely on the level of experience the participants had accumulated. The idea of experience needed fresh research given these findings, and as it came up again in the third iteration, it is discussed more fully in the next chapter.

Scaffolding support

In this first attempt at adding learning skills, it became apparent that the level of achievement participants were able to demonstrate for each learning skill depended on their level of engagement with their context, that is, the amount of practice they had had in a particular type of ultrasound scan. There were some parallels with their stage in the course – loosely defined here as novice, intermediate or advanced – but it was more the level in particular skills, as was seen in the example above of the intermediate student who was only at novice level in a particular topic area (obstetric ultrasound) in her entry under 'judgment'. She was tentative in her discourse, as she had not had sufficient experience in that area compared to the higher levels of judgment expressed by those who had accumulated significant experience.

Combining this insight with the surprising resistance from the teaching team to have different portfolio instructions for different stages in the

program led the researcher to investigate concepts that could be appealing to the teachers and convince them to embrace the concept of incrementally adjusting the portfolio tasks depending on the stage of the course. The most promising was the literature pertaining to the ideas of scaffolding.

Ideas about scaffolding arose from Soviet psychologist Lev Vygotskii's theories on learning. In particular, he theorised that learning occurred in 'zones of proximal development' (Vygotskii, 1978, p. 35). His claim was that these zones lie between what a learner can do without help and what they are unable to do, that is, what they can do when guided by teachers and peers. His view was that learning occurs in social settings through interaction with peers and teachers and that these social interactions fundamentally shape and transform what the student learns. The guidance provided by the teachers to achieve the learning was subsequently developed and was termed 'scaffolding', that is, steps of interim support that enable eventual independence. While never used by Vygotskii, it was introduced in an attempt to operationalise the idea of teaching in the zone of proximal development, within 'the consensus that Vygotskian socio-cultural theory and the notion of the zone of proximal development are at the heart of the concept' (Verenikina, 2008, p. 163). While much of the focus of this work is on children's learning, these ideas have been taken up in higher education. Wilson and Deveraux (2014), for example, envisage scaffolding as 'a shared space in which the student operates in collaboration with others to tackle tasks' (p. A-92), the 'others' being lecturers, tutors and peers. These authors also contend that assessment tasks are the best place for this to occur: 'As academics are all too aware, assessment tasks are a powerful driver of student learning, and thus afford an ideal framework for designed-in scaffolding' (p. A-95), while cautioning that challenging tasks do need adequate support.

The idea of scaffolding support for the portfolio was presented to the team, who by this point had gradually come around to the idea that requiring different portfolio support at different stages might well enhance student

learning, and that this would infer different explanations through the written documentation. They were convinced to take it on board and it was adopted in the next iteration.

Reaping the Benefits

The second cohort of participants (2011 cohort) was able to evaluate the changes implemented from the first and second iterations. That is, they were the first novice cohort to have the updated guidelines as a baseline (their response was discussed in iteration 1) and to attend the specially designed experiential tutorial dedicated to creating portfolio entries. As intermediate participants they were the first to receive a tutorial on the topic of reflective practice with experienced teaching staff, prior to engaging with it.

Participants were recruited to Focus Group 6 during their on-campus attendance (seven students) and three interviews were held once the semester had finished. Similar questioning was conducted as for the previous groups. Portfolios of eight participants from this cohort were investigated for the new interventions.

The participants of focus groups and interviews reported the portfolio induction tutorial to be very useful, a good outcome compared to the original group who could barely recall having discussed portfolios. In the formative evaluation of portfolios, there were no unsatisfactory submissions from the participants or the student cohort at large (compared to one participant and three other students that needed help previously). While it is not possible to attribute causality, as other factors could well have contributed, the teaching team felt that the tutorial had been successful, and that the standard of portfolios submitted by the novice participants had been raised. One issue of concern arose. It had been decided (see 'selection of content' section, this chapter) to include a 'physics/artefact' example, and to discuss other topics such as ethics and workplace health and safety (WH&S);

however, this was not successful. The participants avoided the physics example, deeming it 'too difficult' and expressed the wish to 'keep it simple' (fg, intermediate participant). As they were still grappling with scanning of anatomy at this early stage of learning in a new field, and had not yet had the physics teaching needed, this proved too complex. This element of the tutorial was removed, and it was decided to introduce an 'advanced' portfolio tutorial at the midpoint of the course when the physics had been covered, and ethics and WH&S portfolio scenarios could be introduced and any other areas that might be raised could be discussed.

The researcher questioned the focus group and interviewees regarding their thoughts on the consistency of assessors and the feedback they had been given, but there was a great deal of variation in comments and no consistent points raised. One participant who was unable to attend the focus group did send the following text message to her university supervisor (a member of the teaching team), which said:

> Hello (name), how are you? Tried to call you today just to say Im (sic) very pleased with your feedback. It is invaluable truly! Thank you. I know it must have taken you ages to do. I wrote it not only for uni and to get a mark, but also for myself to make me more knowledgable (sic) about the topic … (text message, intermediate participant).

This group of participants also experienced the changes introduced on the basis of the first cohort's interactions with the interventions of iteration 3, and this will be discussed in chapter 6.

Conclusion

The primary concern of this chapter has been to research interventions designed to promote the learning skills of independent learning, judgment and reflection. This involved the intermediate participants' interactions

with the second iteration of the portfolio task. Rich information was gained from focus groups, interviews and portfolio entries, which the researcher and the teaching team analysed and from which the various decisions in Table 4 were formulated. The interventions were considered valuable and their continuation into the next iteration will allow further evidence to build regarding their impact on participants during the course and then into practice.

Professional development of the researcher and teaching team also took place when considering the themes to emerge from the broader evaluation of the interventions; those of confidence, experience and scaffolding support. Each new theme to present itself was related back to the literature in order to inform ongoing understanding. In educational design research, the design researcher can find themselves in multiple roles including advocate and critic. While this can be extremely useful in formative evaluation as they may 'gain deeper and often sharper insights into the strengths and weaknesses of a design' (McKenney et al., p. 83), the potential for conflict is obvious. Concerns of this nature have been addressed in the 'ethics' section of chapter 3, but it is important to seek to reduce impact 'by striving for unobtrusiveness through making the research setting as natural and genuine as possible' (p 83). The close relationship of the researcher, the team, the participants and the context in this study ensured the genuineness of the work in this iteration.

The next chapter, chapter 6, will take these changes into the next iteration of the portfolio.

Chapter 6 Third Iteration

Introduction

In designing a portfolio with the aim of facilitating participants' longer-term learning into their early practice, this thesis is investigating pedagogical interventions using an educational design research approach emphasising iterative cycles, as discussed in previous chapters. This chapter analyses the third and, for the research reported in this thesis, final iteration of the portfolio task. The first iteration examined an existing assessment task and the analysis of participant feedback identified two major factors they found valuable in portfolio learning; one lay in creating continuous engagement between theory and moments of interesting practice, and the other was the confidence participants gained through documenting their achievements and successes. Continuing with the requirement of one portfolio entry per week retained these desirable features. Participant feedback also led to improvements to the induction to the task, leading to the implementation of greater support for beginner participants.

The second iteration began the important addition of pedagogical intervention strategies intended to encourage longer-term learning skills through portfolio tasks: independent learning, judgment and reflection. Participants' feedback and staff discussion around these additions determined them to be valuable, so they continued into this, the third iteration. The primary aim of this third iteration however is the incorporation of two further tasks designed to promote learning in the longer-term. The two inclusions are:

1) Self-assessment – participants are asked to review, assess and critique the quality of their work, and then to think about how that might translate into the continuing professional development (CPD) requirements of the profession, which they will need once they have qualified.

2) Competence – encompasses the idea of facilitating participants' capacity to judge their own competence, so that they might continue this once they have left the support of the university and entered their early qualified practice.

This chapter provides local and broader evaluations of these features through the research and the findings are outlined below.

Iteration 3 - Description

The participants evaluating the design changes for the third iteration were at the end of their third of four semesters, and being approximately three-quarters of the way through their course, they are now designated the 'advanced' participants. The design changes implemented in each of the previous iterations were based on their feedback and integrated into each of the 'Clinical Practice' study guides they received for the semester. They were experienced in their university program including all the various assessment tasks, particularly in creating portfolio entries. Each would have accumulated approximately 40 to 50 weekly entries over the previous 18 months. Participants were gaining independence in some areas of their clinical practice, that is, scanning on their own in some of the basic scans required for course completion and professional accreditation. Most participated in the previous focus groups and interviews reported under the first and second iterations. Their portfolios have now been formally assessed, both formatively early in their course, and summatively in each of the subsequent 'clinical education' subjects in their program. Seven participants now came together as Focus Group 5 near the end of the first semester of their second (final) year at an on-campus attendance to review the third iteration interventions. Individual interviews (3 participants) were again held at the end of semester and nine portfolios were evaluated after assessments had been completed, the point of saturation of new themes determining the number of each. As with the previous two chapters,

quotations from the data are annotated by focus group (fg), interview (int) or portfolio (pf), with the level of the participant following as novice, intermediate or advanced. For example, a quote from an advanced participant's portfolio has the notation:

'quotation' (pf, advanced participant)

Further Design Interventions for Longer-term Learning

Two new interventions were introduced in the third iteration. One involved a task aimed at raising awareness of, and encouraging practice in, self-assessment, an important skill to continue into early qualified life, where ongoing assessment of one's current capabilities and future learning needs is essential. The other was the concept that, rather than being 'tested' for competence by the university teachers and their workplace supervisors, the participants could work with their portfolio to demonstrate their competence to themselves and others. Within the course, this could encourage engagement with understanding relevant criteria and standards, while at the end of the course and into early practice, this might be useful for employment or negotiating skills-based remuneration increases. As Yorke and Knight (2006) state in their argument that broader achievements and complex outcomes are not easily demonstrated through grades on a transcript: 'The student can assemble a portfolio of evidence of achievements that can be distilled to suit particular needs, such as the construction of a resumé for a job application' (p. 581). With this in mind, the new instructions for the participants' final semester of portfolio requirements had an introduction in the printed materials that read:

As this is the final clinical practice unit for your course, and you are in your last semester prior to becoming a qualified practitioner, you will continue your portfolio with examples from your professional practice that will now demonstrate deeper knowledge with more complexity. There are also a number of requirements to be completed over the semester that will

encourage you to reflect on your achievements, assess your own progress, and think about how you will go forward with your learning (sonographers are always learning!). You will also have the opportunity to consider how you will tackle your continued learning and get the most from your CPD requirements (Clinical Practice – Professional Portfolio Guidelines, 2011).

The instructions then continued with outlines for the portfolio entries for the self-assessment and competency tasks. Each is discussed below, along with the findings from the analysis of the portfolio entries themselves, and the themes arising from interviews and focus groups with participants' feedback. In the final section, the responses to these findings and feedback are provided.

Self-assessment

As discussed in chapter 2, raising students' awareness of the importance of self-assessment and providing learning opportunities to develop the skills, resources and abilities to self-assess are important for ongoing learning. By the time this iteration was implemented, most of the participants in this study had gained approximately 15-18 months of experience as a student sonographer. Most had become competent in two or three out of the five basic areas of ultrasound examinations required by the end of their course (and by the accreditation standards of the professional body). In their clinical practice, they were scanning on their own in these areas, usually with a greater time allowed than for qualified staff (for example, 45 minutes instead of the usual 30 minutes for an abdominal ultrasound). They may have had a senior 'check' the scan afterwards, or they may have been at the stage where they would only call in a senior if they were not confident they had completed the scan thoroughly or if there was a pathology or unusual finding present.

Upon finishing the course however, they would not only almost immediately

need to be performing these scans unaided and to time, but would also need to learn further applications of ultrasound that qualified staff are expected to perform in most departments (such as musculoskeletal scans – shoulders, elbows, knees, etc., and interventional studies – thyroid fine needle aspiration, cortisone injections, etc.). So it was very important from a professional perspective to raise awareness of the need for self-managed learning beyond the course, an important component of which is self-assessment. This reflects the general situation across many university courses incorporating professional competency, and particularly where the community is dependent upon practitioners to be competent and safe when dealing with their health.

The instructions for the new portfolio entry on self-assessment asked students to revisit their earlier entries and discuss the development of their ability to assess the quality of their work. It also sought to turn their attention to the various options for their future continuing professional education needs. It read:

> Self-assessment – review your earlier portfolio entries and discuss your increasing awareness and/or ability to assess the quality of your work. Discuss what 'quality' means to you in the context of being a sonographer and how you might build on the critiques you have performed on your work during the course, after the course has finished. Explore your options as an Australian-qualified sonographer for completing your Continuing Professional Development points, and conclude with a paragraph on which option you might take and why (Clinical Practice – Professional Portfolio Guidelines, 2011).

The discussion of this intervention is divided into two parts, the first around the core self-assessment elements and the second around the CPD theme. In the data analysed by the researcher for the self-assessment part of this new intervention, that is, reviewing and critiquing the quality of their work, a

handful of participants critiqued their past images well, and several included an holistic approach to image quality and patient care in their example of self-assessment. Representative of the latter, one participant concluded:

> On completion of the course, I would build on the critiques I have
> performed on my own work by implementing different techniques
> to improve by (sic) scanning and imaging style. Observing other
> methods and techniques implemented by the senior sonographers
> in the department will also allow me to improve the quality of my
> work
>
> (pf, advanced participant).

While this indicates these few participants appeared to find the critique of past performances worthwhile and could project their assessment into future work, the majority of participants failed to do so. Student self-assessment probably lacks meaning without engaging students with the criteria and standards that faculty use to judge their work, and thus it was felt that what was needed was a more detailed and hands-on attempt to engage students in self-assessment, starting with some in-class experience of how to do this. This is further discussed later in the chapter.

What did emerge from the evaluation on the self-assessment data were two strong themes, 'quality' and 'experience', each of which is discussed in turn, followed by the refinements made based on the findings.

Quality

A recurring theme to emerge from the self-assessment data was that of 'quality'. It revealed most participants could suggest improvements to the quality of their work. The following two quotes illustrate this, with the first outlining quality as an early struggle to 'find' organs using the ultrasound transducer, while the second expresses her quality in terms of difficulties in documenting pathology:

Most of my early portfolio entries focused on acquiring the images required with little focus on the quality or reproducibility of images
(pf, advanced participant).

In reviewing the earlier portfolio entries, it has become evident to me that particular images could have been improved in illustrating specific pathologies. Such examples include (technical details) (pf, advanced participant).

Significantly, these comments show that the participants perceived the question of quality as referring to the more narrow notion of image quality, rather than the quality of their performance on the examination overall. Another example of a participant concentrating on technical quality read:

'A quality study and images also demonstrates the use of Colour Doppler (and other technicalities) (pf, advanced participant).

Another example involved a 'follow-up' case in which the participant was able to directly compare her work on the same patient over a gap of some months. This situation is not uncommon, as the participants are usually performing ultrasound examinations three days per week during the two years of their university program. Again, it was the technical quality of the images that was important to her:

Many studies will require follow-up ultrasounds, for example to assess abscess or DVT resolution, or tumour growth. It is important in these cases that the images are of optimal quality to make a true assessment of change. Location, ultrasound characteristics and size should be as specific as possible. It is important to refer to previous images and make new (sic) as equivalent as possible (pf, advanced participant).

In interviews and focus groups, again participants focused on image quality rather than a more holistic overview of the quality of the study (as intended by the instruction 'Discuss what 'quality' means to you in the context of being a sonographer'). For example:

Researcher: So you do think about the quality of the scans?

Participant: Yep … at the start it was probably all zoomed, I got a bit carried away … but I don't zoom that much now … and you know that you can change the factors and do that a bit better and enhance the quality … once you understand what the quality is like, you can make it better.

Researcher: And you? (bringing another participant into the discussion)

Participant: Ummm, I go through it with (my supervisor) … zoom it up a little more … change the TGC … overall gain, stuff like that … yeah, that's normally how I go through it, critiquing it and making it a little bit better (fg, researcher and advanced participants).

The participants' perceptions of 'quality' at this point therefore seemed to relate primarily to image parameters. Of note, this contrasted markedly with the graduate interviews, in which quality was thought of in a much more holistic sense of quality of the entire examination:

… yeah, sometimes like when I've found something ... the radiologist or the others might say ... you know, 'Good job!' ... Or sometimes they'll say, 'I wouldn't have even seen that' ... sometimes, I think I annoy them sometimes with some things, they're like, 'Why are you even looking there? Don't bother, you're just making more work.' (laughs) ... yeah, a little bit of that but not a lot (int, graduate participant).

> To me in the context of being a sonographer, 'quality' means is
> (sic) performing or producing work at a high level or superior
> grade (int, graduate participant).

The emphasis on technical image quality in the 'advanced' participants could be due to a number of factors. One is perhaps the emphasis on digital image processing and technical image quality in their university studies, particularly in the physics components of their undergraduate and postgraduate courses, where quality is identified in terms of measurements of image resolution and other factors. Another factor may relate to the instructions, which perhaps overemphasised the word 'quality'. It may well also reflect that the participants, still in 'student' mode, were insufficiently experienced to conceptualise their role beyond obtaining good images and had yet to feel responsible for the whole patient encounter. Further comments are made below on the redesign of this element based on these findings.

Experience

Many participants expressed, verbally and through portfolio entries, that increasing experience was the key to being able to critique their work, both for self-assessment and, as identified in chapter 5, in making clinical judgments. One of the participants provided a good example of the nature of these comments, as she struggled to express how she determined the quality of her work, saying she found experience to be a factor:

> I don't know how to say it … 'cause it's really with experience, and
> you need people around you during the day just to ask …
> questions and stuff, yeah, it's really hard, I mean you get enough
> information at Uni but … (shrugs) (int, advanced participant).

Another participant, typical of many, demonstrated that the importance of experience to her was identifying the various kinds of pathologies:

… real-time scanning and technique is the most important thing
sonographers need to grasp and I believe this comes with
experience and time. As an example, not only until my 4th-5th
scan that I realised that abscesses can form in the epididymis if
there is an infection/inflammation … (interview, advanced
participant).

A particularly interesting illustration was provided over the duration of the
research by a participant who was a mature student. Having spent his early
career in the army before returning to university to complete his
undergraduate degree, he then progressed to his ultrasound qualification.
At his novice interview, when asked about the quality of his examinations,
he expressed frustration:

I still ask why, I still ask myself, why someone else can put the
probe on the same spot, same image, same gel, without any
change and the image is clear, and the reply I always get is – it's
experience (int, novice participant).

At his intermediate interview, this participant talked about his
improvements in judgment, in terms of image quality and accuracy, through
experience. He commented:

I probably do (make better judgment calls) because of experience,
more experience. I now … it's almost like … cysts on the kidney
say, and whether it's this big or this big; whether it's a pyramid or
not … I almost feel like … is it important whether it's a cyst or a
pyramid … and that's just confidence. … Or measuring the length
of a kidney … is it important if it's … I can see where it is
important … but it's trying to get within that 5 ml (millimetres) if
I twist it a bit more … it's irrelevant … yeah, if it's 14cm long it's
relevant but…. It's things like that I think … it's from experience
I've learned to see what is important and what's not (int,
intermediate participant).

He came full circle when asked about the quality of his work, and how he assessed it, in his graduate interview:

> The quality of my work ... (musing) I see ... the quality of my work is much better, and the reason I can see that is because of the guys I'm training ... I can see where they're coming from and they sort of just go (screws face up tight; researcher and participant laugh) ... they always ask you ... and I can see how daunting it is ... but for me, yes, it's no longer that effort and I just keep telling them it's just experience (int, graduate participant).

It was apparent therefore that the participants struggled to explain self-assessment of the quality of their work, but correlated it strongly with increasing levels of experience.

The analysis of the self-assessment component of the intervention thus far has identified that the concept had not been grasped terribly well by the participants. Few participants critiqued the quality of their work in a holistic manner, most looking at 'quality' as relating to the images obtained rather than the patient encounter. It was felt by the teaching team that the self-assessment intervention would benefit from a tutorial with more explanation and discussion, incorporating the concepts of using people and resources to assist with self-assessment, and include a session on giving and receiving feedback. With this support, it was felt it was an important inclusion in the portfolio. The changes based on this analysis are discussed below, and importantly, as it has become a significant theme, further theoretical understandings of 'experience' are developed in the broader impact section.

Continuing professional development (CPD)

In the second part of the new self-assessment portfolio intervention, the instructions asked participants to explore their options for the mandatory continuing professional development (CPD) required of them after graduation:

Explore your options as an Australian qualified sonographer for completing your Continuing Professional Development points, and conclude with a paragraph on which option you might take and why (Clinical Practice – Professional Portfolio Guidelines, 2011).

One of the touted benefits for students in completing a portfolio is that they can continue it on to their continuing professional education, solving '…the lack of continuity … (which)… should be consistent with progression from technical discrete abilities to full integration of professional competences…' (David, 2001, p. 535). In this group of participants, with one semester remaining of their course, the portfolio entries showed a significant variety in their responses. Some demonstrated a complete lack of engagement with that part of the instructions and had neglected to include any comment on it in their entries. Some portfolio entries showed that participants had investigated CPD but were confused about it. One or two participants had followed the instructions, obtained correct information and had made a considered choice. The variation found might well have been because students were not prepared to look at something they did not require until they had completed their course. It could also be due in part to the fact that mandatory CPD requirements were quite a new undertaking in this profession at the time and there was some confusion about it in the workforce at large. One participant, illustrative of the confused group, wrote:

Continuing Professional Development points can be gained under several programs run by the Australian Sonographer Accreditation Registration (ASAR).

The misconception in this statement is that this particular body does not 'run programs' for CPD points; they are the professional body to which sonographers must submit evidence of CPD attainment through programs

run by other professional groups. Another participant illustrated a better understanding from her investigation:

> ASAR currently recognises 4 CPD programs:
> - the Maintenance Of Standards In Professional Practice (MOSIPP) program conducted by the Australasian Society for Ultrasound in Medicine (ASUM)
> - …(details of other programs) …
>
> Given I don't have a radiological background, (one of the programs) is not an option for me. I might take the PD-asa CPD Program option because they have … branch meetings which can contribute to CPD points and the program has a more flexible approach to some of the other programs. They also automatically log ASA's CPD activities for you (pf, advanced participant).

In the focus group, participants were asked whether they thought they might continue with their portfolios after the course: 'Can you see that you might take that forward … into your continuing ed.?' There were looks of horror at this suggestion and murmurs of disbelief that there was more work to be done after the course finished! But it did lead into a discussion of the participants' use of portfolios. One remarked that she used it as a means of summarising important differential diagnoses:

> I guess I use it more for pathology differentiation … so like I had a … a retinal detachment … like about 6 months ago and I thought … 'That's really interesting … so what would my differentials be?' … and I kind of did a table in one of my things that showed the differential from choroidal and retinal detachments and … so that then I have a quick reference … you know like grading tenosynovitis compared to something else or … just you know so like I tend to go back and refer to the table I did for that … so I have some quick references for differentials as opposed to you know … having to look up a textbook each time …

I just have the tables that I've done from that (in the portfolio) …
(int, advanced participant).

When asked if she kept the portfolio at work, she said she did, and when the
question was cast more widely, about half the students indicated they kept
their portfolios at work and consulted them from time to time. Bringing
back into focus the topic of whether participants might find it useful for
continuing education, the researcher again prompted:

Researcher: Do you think you might add on to it now you've
nearly finished (the course) … once you have
finished?

Participant 1: Well I always get extra images … I think, 'Well
that's a great image' so I take it if I've got time …
but I never have any time … (laughs).

Researcher: Anyone else?

Participant 2: We are asked to present cases as part of our
educational processes (at work) … so we have to …
like sort of … compile things that are
interesting, 'cause like when you have to do a talk,
you have nothing to talk about … it's pretty crappy
(laughter) (int, advanced participants).

Thus the findings showed generally that the portfolio was performing an
important function in consolidating learners' analysis and synthesis of
relevant information for future reference, and for collecting interesting
cases for local educational meetings. Overall though, the evaluation of this
element revealed the participants were not terribly engaged in thinking
about their future CPD requirements, and it was felt they were unable to
give it serious attention at this stage as it just was not relevant to them.
The teaching team decided that rather than make this a portfolio
requirement, it might be more useful to invite one of the professional bodies
to present to students regarding CPD requirements in an on-campus block,

and to provide accurate written information on professional requirements of their CPD as they left the program. This would include information on the various relevant professional associations and their roles, and the importance of professional indemnity insurance. This had been done informally in the past, but the findings identified the need for more formal guidance for students as they made this transition.

Evaluation – Local Impact of 'Self-Assessment' Intervention

Once again, this section will evaluate the local impact of the self-assessment portfolio intervention through the lens of educational design research. As for the previous two iterations, a teaching team meeting was held to discuss the findings from the research participants by the researcher and the impressions of the other teachers from the rest of the student cohort. The self-assessment intervention was not as successful as those interventions included in the second iteration, but it was felt it still encouraged valuable learning and should be retained with further revisions. Based on participant feedback, the teaching team felt that improvements in the 'self-assessment' component could be made by splitting it into two aspects:

1)   Include a dedicated tutorial on self-assessment as was done for the portfolio induction and formulate, at points throughout the course, opportunities to engage with assessment criteria and standards. Importantly, discussion should cover the idea that self-assessment includes not just 'self', but brings in peers, colleagues and others whose opinions 'count'. It also encompasses working with and making the most from their feedback.

2)   Incorporate changes that address the separate issues of a) image quality and b) 'study quality' (in a holistic sense) as students' progress in their program.

Additionally the 'CPD' requirement was also considered and led to the third suggested change:

3) Remove the 'CPD' section from the portfolio task and include it in face-to-face teaching near the end of the program. Invite the professional bodies to explain the particularities of their CPD programs to the students, and include current, accurate written guidance for students on the CPD process at the end of their course.

Each of these changes would be incorporated for the following cohort of students and, given the teaching team had seen the benefits of working with such feedback, other assessment tasks were also likely to undergo scrutiny in the future. One concern raised by a member of the teaching team was that self-assessment should be worthwhile both within the program and also for future professional practice as something professionals do, and therefore would incidentally be useful for CPD, rather than inadvertently plant the idea that professionals do CPD because they have to, or to satisfy the professional body. In working out how to rephrase the instructions to rectify this, the tone of the instructions for the new interventions, and in fact for the portfolio instructions generally, were brought into question. On review, it was found the wording was overly demanding and could be considered contradictory to what we were saying we wanted for the students. In discourse terms, it had the potential to de-skill them professionally by asserting authority over them. For example, the self-assessment instructions said, '*review* … and *discuss* … the quality of your work. *Discuss* what 'quality' means to you …'. The team decided a review of all the instructions was necessary, with the intention of changing the tone in the direction of drawing students' attention to what they needed to demonstrate professionally, rather than insisting they produce the goods as an authority figure.

As the intention is to encourage students to take responsibility for their learning, our role should be one of helping their awareness of what good professionals do, and this should be reflected in the instructions. Picking up also the need for scaffolding support, as discussed in the second iteration,

these would be different depending on the stage of the course. Thus, the written directions were overhauled. Examples of the new instructions are given below for the self-assessment entry, at two different stages of the program.

Self-assessment – Year 1

In practice, sonographers find they need to continually assess (review and critique) the quality of their work and usually find the assistance of peers and/or mentors helpful. Consider the ideas presented in your tutorial on self-assessment and implement these for one of your earlier portfolio entries to help you assess the quality of the work (the quality of the whole study, not just image quality). This might entail, for example, assessing it against the criteria in the portfolio assessment sheet and/or enlisting the help of a more senior colleague to give you feedback on the standard of the work. Did this process help? Discuss why or why not. (Clinical Practice – Professional Portfolio Guidelines, 2012, Semester 2).

'Self-assessment – Year 2

Now that you are becoming more experienced, you will appreciate the need for sonographers, as professionals, to continually self-assess the quality of their work. They find it increases confidence and is invaluable in developing their expertise in the new applications and advanced techniques that arise constantly in our ever-expanding field. Consider your self-assessment portfolio entry from the last semester (or two semesters as applicable) and discuss how you would critique it now (include not only image quality but the quality of the patient encounter overall). Anticipating that your studies have improved over time, choose another case you feel demonstrates your skills at a higher level and self-assess this one. Are there any professional standards appropriate to assess it against? Include a discussion on how you went about this and comment on whether this process helped you

and why or why not (Clinical Practice – Professional Portfolio
Guidelines, 2013, Semesters 1 and 2).

Competence

The second new design element to be added to the portfolio in the third
iteration was centred on demonstrating competence. As the participants
were close to their final semester before finishing their course, and now had
approximately 18 months experience, they were gaining competence in a
number of areas. Competence in this context, as discussed in chapter 3, was
assessed primarily through a combination of the Portfolio, Case Studies and
Clinical Assessments (observation of their performance of examinations of
patients in their workplace). Typical of many professional courses, the
assessment of competence is placed on the judgment of the supervisor,
rather than the judgment of the student. As Boud, Lawson and Thompson
(2013) have argued: 'The role of students tends to be to offer themselves to
be assessed by others. This can create dependency on the authority of the
teacher' (p. 942). The aim of asking participants to demonstrate competence
in their portfolio was to encourage the idea that they are responsible for
assessing their own competence, and will continue to need to do so as they
take on various new applications in their early qualified practice. It also
fitted in well with the requirements of the accrediting body, which asks for
certification of competence in five areas. The new instructions stated that in
their *final* semester:

> You will continue to provide Portfolio entries of interesting and
> more complex cases to demonstrate your learning, one per week
> for the 13 weeks of semester. However, some of the 'weeks' must
> be set aside for various requirements as set out below. These may
> be done in any week of the semester, but should be appropriately
> labeled (e.g. Week 3 – Competence in Breast Ultrasound).
>
> FOUR of these weeks should be set aside to document that you
> are at 'competent' level in four of the five areas below (competence
> in the fifth area should be demonstrated in your Case Study).

These are taken directly from the Australian Sonographer Accreditation Registry (ASAR) requirements. An example of demonstrating competence could include a case of a typical pathology where you state you have performed the examination unaided and were confident in your diagnosis, backed up by the radiologist's report and/or your worksheet and/or further investigations and/or your supervisor's signature. …

1. General abdominal scanning applications. 2. Male/female pelvic scanning applications. 3. Obstetric scanning applications (any of 1st, 2nd or 3rd trimester). 4. Superficial parts scanning applications, including breast, scrotum and anterior neck. 5. Basic vascular ultrasound applications.

As with previous interventions, the portfolios were again analysed for themes arising, as were interviews and focus groups. In the 'Competence' area, there was a paucity of information from the interviews and focus groups, and there were no particular themes that emerged. Some of the interviews had lengthy discussions on some of the questions, and so due to time limitations, unfortunately this last question was missed. This was a limitation of this study, as themes around competence may have emerged had the researcher spent sufficient time discussing competence with the participants. One or two participants used this prompt to raise concerns over the types of studies offered at their workplace and how they would achieve competence in areas that were not offered at their site. They were referred for academic counseling. One participant talked about how the number of areas of competence would relate to their pay level once qualified. Referring to a recently qualified co-worker in a skills-based remuneration scheme, he said: '… because the pay required it, he's gone out of his way to extend, to do other things, such as DVT and musculoskeletal, and…. each bit of anatomy … but it was pay driven' (int, advanced participant).

The participants' portfolio entries were also extremely variable. A number of participants correctly labeled their portfolio entries as 'Competence – Area' (e.g., 'Competence – Thyroid'), but the text gave no comment on how this showed they were competent, nor did they follow the instructions about providing evidence of competence, such as including the report or a supervisors signature – they simply completed the entry as they had done in previous semesters. One participant was totally confused, labeling her entries as 'Competence – Judgment: Area; Competence – Self-Assessment: Area' and so on. A few made comments on their entries that they felt they had done a thorough scan, for example:

> I believe my images demonstrates the pathology quite well as I took (images demonstrating particular features) … I showed that the clot was (ultrasound appearances of clots) … I also checked (for associated findings) … I also checked (for related pathology) … which included everything (demonstrated a comprehensive exam) (pf, advanced participant.)

And

> In review of the patient's clinical history and sonographic appearances, I was able to confidently make the diagnosis as a dermoid cyst (pf, advanced participant).

A small number produced entries that were along the lines intended by the instructions, that is, they commented that they felt the entry showed competence in a particular area and included their worksheets and the radiologists' reports as evidence in their portfolio. An example is this one:

> An image of the fetal nasal bone was confidently presented as it demonstrates the 'equal sign', depicting the presence of a nasal bone. The criteria I implemented to confidently state the presence of a nasal bone includes: (two dot points of 50-60 w each of details of sonographic appearances). The presence of a nasal bone in this fetus was supported by the reporting obstetrician (see report) (pf, advanced participant).

One participant provided a good demonstration of how she was more confident in some areas than others, as shown in the following two entries. The first talks about using support from two colleagues, while in the second she has not needed this support, saying she could be confident in her diagnosis:

> I completed the abdominal examination unaided using [technical details]. The senior sonographer was then called in to perform the examination to ensure no other abnormality is evident apart from my initial findings. … In the gallbladder … I was able to confidently diagnose the pathology. … This was supported by the senior sonographer [who checked the scan] … and the reporting radiologist on site (refer to worksheet and radiologist's report). The examination could have been improved by …

And

> The bilateral breast ultrasound scan was completed unaided … bilateral multiple cysts were again noted … In the left breast, at 3 o'clock, 1 cm from the nipple, there is … (signs and techniques). From these sonographic appearances and having observed numerous similar findings, I was able to confidently diagnose the pathology as a small lipoma (refer to worksheet and report) (pf, advanced participant).

It was pleasing to see, in the first study, that even though this entry is demonstrating competence, she is still critiquing her work.

Evaluation: Local Impact of 'Competence' Intervention

Students' ability to assess their own competence is paramount once they move on from the support of the university. As discussed, this needs to be independent of the influence of 'being marked'. In many professions, demonstrating ongoing competence is a requirement for remaining in the

profession, with many requiring evidence of continuing competence, for example in the health professions in Australia. This research found the intervention addressing competence in the last semester of the participant's program did not particularly work as intended. This was discussed at the same teaching team meeting as the self-assessment item reported above, and again the conversation involved feedback from the participants' efforts and impressions of the teachers from the remainder of the student group. It was thought the misunderstandings around the competence entry might have arisen because they had not previously had the responsibility for demonstrating competence and thus were ingrained in the belief that that is the sole concern of the assessors.

The team agreed that developing student capacity to articulate competence for themselves was necessary, but that, like some of the other features, most students needed discussion and clarification of the concept before their first attempt. It would therefore be given more upfront support in tutorial format and the staff decided that an online resource would be developed that detailed what competence might mean in each of the topic areas (abdomen, pelvic, etc. as per the instructions from the guide above). Students could then access these resources themselves as they gained sufficient exposure to each area and were ready to demonstrate competence. At the end of the course, a debriefing on this requirement would be undertaken and discussion raised around the idea of ongoing self-assessment of competence into early qualified practice.

Evaluation – Iteration 3: Broader Impact

The third iteration reported here introduced two new interventions designed to foster further aspects of longer-term learning, self-assessment and competence. Within the self-assessment task was an element asking students to think about their future CPD requirements, and as this was quite unsuccessful, it would not be included in the portfolio in the future; a

different strategy would be undertaken. The analysis revealed that otherwise, the two interventions had the potential to be valuable components of the portfolio, given further supportive activities. The self-assessment task, it was found, might be more valuable if introduced earlier in the program, with some teaching strategies for support and resources available when individuals reached the point where demonstrating competence in each of the five accreditation topics was relevant to them. It also found that the theme arising around 'quality' would be a fruitful idea to discuss with students, particularly in the more advanced stages once they had moved in their thinking from 'image quality' to 'quality of work', and this could sit well in their 'professional issues' unit of study. The second theme to emerge, 'experience', had also been a strong theme to arise from the 'judgment' intervention in the second iteration, and would require further theoretical work before a decision could be made around it, which is discussed in a dedicated section below. The changes resulting from the work thus far in iteration 3 are summarised in Table 5.

Table 5 – Iteration 3: Summary of design changes implemented in response to feedback on each of the new design interventions in Iteration 3.

Feedback/Analysis	Response
Self-Assessment	Dedicated tutorial with explanation and discussion of self-assessment, and practice in self-assessing against criteria and standards. To be introduced earlier
Quality	Introduce holistic notions of quality of studies in an appropriate face-to-face class and in teaching materials in 'professional issues' subject
Experience	See 'Broader evaluation' section below
Continuing Professional Development	Remove CPD item from portfolio and include it in face-to-face teaching at the end of the course; invite member of professional body to advise students on options after their course finishes. Create a resource for students on their professional requirements as newly qualified sonographers.
Competence	Include a tutorial about demonstrating competence at a time when they have sufficient experience to do so in one topic area. Develop online resources detailing how students might identify competence for each of the 5 topic areas required for accreditation that students are able to access themselves as they gain sufficient exposure to each topic to make it relevant.

Experience

As this was a recurring theme across the last two iterations, it became the subject of intense scrutiny for the researcher and the teaching staff. Efforts were made to try to unpack the underlying meaning of the participants' comments when using this expression. Therefore, in the representative example given earlier:

> I don't know how to say it … 'cause it's really with experience, and
> you need people around you during the day just to ask …
> questions and stuff, yeah, it's really hard, I mean you get enough
> information at Uni but … (shrugs) (int, advanced participant)

the student appears to be indicating that the complexity of everyday practice is such that she needed to be consistently performing the task with continuous input from supervisors and colleagues, that is, 'just to ask' the people 'around during the day', in order to notice what she needed to get on with the job. Further exploration in interviews unpicked this with a number

of participants. They understood 'experience' to include having the constant routine of seeing the many different variations of 'normal' anatomy, in variations of body type, then building on this to recognise when something was abnormal. This then led to recognising 'routine' abnormalities after seeing a particular condition multiple times, in different people with slightly different variations, and then uncommon and rare ones.

Participants were at pains to point out that it was not a linear path, as practice throws up everything at once, and this was usually in the form of a complaint such as, 'I don't know why we can't just have all abdos [abdominal ultrasound scans] first, to get used to one thing at a time' (int, intermediate participant). The reference above to getting 'enough information at uni' probably refers to lectures and tutorials, which provided teaching on the ultrasound appearances of abnormalities and so on, and while they are 'enough', as she sees it, they are only helpful in the setting of practising practice, that is, of repetitive instances of seeing variations on the same theme and building a bank of normal and variations of similar findings. Boud et al. (1993) say they 'have been reinforced in our view of learning as an active process in which the learner needs to work with experience again and again to appreciate the meanings associated with it' (p. 10).

Returning to the literature for further theoretical understandings, as is typical in educational design research, led to the investigation of key ideas about learning through experience. Highlights included Dewey's classic 1938 essay, *Experience and education.* Urging educational reform, he asserted: 'that amid all uncertainties there is one permanent frame of reference: namely, the organic connection between education and personal experience …' (Dewey, 1938, p. 25). These ideas were further developed by pivotal works such as Kolb's (1984) *Experiential learning* and Boud's (1993) *Using experience for learning,* and we are now at the point where learning from experience and experiential learning have extensive bodies of

theoretical and empirical research work behind them. Thomas (2014) believes the principles and philosophies of experiential learning underpin pedagogical approaches such as problem-based learning, inquiry-based learning and adult education (pp. 314-316).

Recently, five contemporary perspectives of experiential learning have been thoughtfully summarised by Tara Fenwick (2000), spurred on by what she believes is an urgent need 'to disrupt and resist reductionist, binary, individualized notions of experiential learning' at a time when an understanding of managed experiential learning is 'ascending as a primary animator of lifelong learning' (p. 244). She uses the term 'experiential learning' because of its well-established tradition in adult education, believing the perspectives she presents (and their critiques) hold the greatest promise for further research. They are:

Reflection – a constructivist perspective, which portrays learners as independent constructors of their own knowledge, has a long and distinguished history (including Vygotskii whose work on learning is discussed in chapter 5, and Schön, whose work on reflection in the workplace is discussed in chapter 2). From this perspective the learner constructs, through reflection, a personal understanding of relevant meanings derived from his or her action in the world (pp. 248-249). Fenwick (2000) sees this as the dominant perspective and seeks to 'disrupt' its influence through further work in the other four perspectives.

Interference – a psychoanalytic perspective, has been taken up 'to help disrupt notions of progressive development, certainty of knowledge, and the centered individual learner' and helps open ways of approaching unconscious behaviours such as the desire for closure and mastery that sometimes governs the ideas of educators (p. 250).

Participation – a situative perspective, in which learning is held to be embedded in the situation in which a person participates, 'defined as engaging in changing processes of human activity in a particular

community. ... Knowledge is ... part of the very process of participation in the immediate situation. ... Knowing is ... entwined with doing' (p. 253).

Resistance – a critical cultural perspective, identifies power as the central issue and learning as 'coming to critical awareness about one's contexts as well as ... what knowledge counts in particular communities, how development is measured, who gets to judge whom and why ...' (p. 258)

Co-emergence – the enactivist perspective of experiential learning, holds that the systems represented by person and context cannot be separate. It assumes that cognition depends on the kinds of experience that come from being bodily embedded in a context. 'Enactivists explore how cognition and environment become simultaneously enacted through experiential learning' (p. 261). 'Change (such as phenomena that other perspectives may observe as learning) occurs through disturbances amplified through feedback loops within and among systems' (p. 262).

Fenwick (2000) completes her paper with a two-page summary of each perspective and comments on 'the educator's role' in each (pp. 267-268). In a reflective role, teachers encourage the reflective process and challenge individual assumptions, while from an interference perspective, they clear spaces for people to learn by working through psychic dilemmas and attending with compassion. From a participation perspective, teachers arrange activities and conditions that help learners best engage with practice, but from a critical cultural perspective, they make explicit the ideologies and practices that construct experience and support resistance. Finally, from an enactivist perspective, teachers would help learners to name and rename changing nuances while being clear about their own entanglement in systems of thought and action.

While represented in very simple terms here, the teaching team were happy to read, talk about and work with the concepts in Fenwick's article to come to understandings about how to support students to get the best possible

learning from what they had termed 'experience'. Those accustomed to teaching students reflective practices were unconcerned about Fenwick's urge to 'disrupt' it and were happy to take on board some of the other perspectives for practical purposes. In particular, the participation perspective, which most related to 'community of practice' ideas, was seen as a way to help students. The notion of experience here conceives that the 'learner moves from peripheral participation in a community to more central positionality with competence' (Fenwick, 2000, p. 268), and they identified with that aim for their students. In practical terms, the researcher felt that the comments from participants had tied experience in strongly with those interventions asking them to critique their work, particularly in self-assessments and in describing clinical judgments. One way to capitalise on this would be to use the student group to capture collective experience and insights. Time would be allocated in the self-assessment tutorials for working with group discussions around the ideas of gaining sufficient experience to critique one's work.

Redesign Summary

The end of 2011 presented a good opportunity for consolidation, when the unit of study guides were being prepared for 2012. Each semester's guide now had different instructions for the portfolio depending on the stage the student had reached in the program, with a collaborative professional tone, and all of the learning skills now had associated elements of support. The changes are summarised in Table 6 below and all were to be implemented for those students commencing in 2012.

Table 6 – Iteration Consolidation Across the Program

Semester	Learning Skill Intervention	Portfolio	Supporting structures

1 – early	Independent Learning	Induction
		
		One entry per week
			• Portfolio tutorial including experience creating entries from scenarios at beginner level
			• Enhanced guidelines that were still flexible and learner-centered, and included portfolio goals
			• Revised tone of all written instructions
			• Discussions of:
			  o reflection - only if raised due to past experiences,
			  o time management especially assessments across program

1 – late	Independent learning Reflection Self-assessment	One entry per week, 3 weeks set aside to demonstrate each of the learning skills	• Discussion of: o How portfolio was going; any concerns following formative assessment • Reflective practice tutorial with experienced team members - basic level • Self-assessment tutorial - includes group work and working with feedback
		Clinical Supervisor's Meeting: Review last year's commitment to strengthen feedback and aims for consistency of assessors. Discuss any issues/benefits	
2	Independent learning Reflection Self-assessment Judgment	One entry per week, 4 weeks set aside to demonstrate each of the learning skills	• Scaffolded instructions for judgment entry – basic in Sem 2, more advanced in Sem 3 and discussion to encourage continuing into practice in Sem 4. • Opportunity to engage with criteria and standards during semester and work with feedback – basic level
3	Independent learning Reflection Self-assessment Judgment	One entry per week, 4 weeks set aside to demonstrate each of the learning skills	• Reflective practice advanced tutorial and discussion • Tutorial on portfolio including experience creating entries from scenarios at advanced level including physics, WH&S, and any other issues • Opportunity to engage with criteria and standards during semester and work with feedback – intermediate level

4	Competence Independent learning Reflection Self-assessment Judgment	One entry per week, 4 weeks set aside to demonstrate each of the learning skills
		
		Additional 4 weeks set aside to demonstrate competence in four of the five areas required for accreditation
			• Tutorial on demonstrating competence and on-line resources in each competency for students to use independently over the semester
			• Opportunity to engage with criteria and standards during semester and work with feedback – advanced level
			• Learning skills session near end of course. Debrief on learning skills developed in the portfolio and encouragement to continue into qualified practice. Includes
			  o Reflective practice
			  o Independent learning; its impact on confidence
			  o Judgment
			  o Self-assessment
			  o Competence

Reaping the benefits

The second cohort of participants (2011 cohort) was able to evaluate the changes implemented following the first and second iterations. That is, they were the first novice cohort to start with the updated induction (their response to the guidelines was discussed in iteration 1) and to attend the specially designed experiential tutorial dedicated to creating portfolio entries. As intermediate participants they were the first to receive a tutorial on the topic of reflective practice with teaching staff experienced in this area, prior to engaging with it.

As advanced students, they were recruited to Focus Group 7 at the end of their third semester. Because they had started their program while the third iteration was running, they did not benefit from the full program of changes outlined in Table 6, as the 2012 cohort would, but the researcher modified their study guides and teaching experiences to capture as many of the improvements as possible. The guidelines they received for the portfolio in their Semester 3 unit of study guides reflected the revised tone intended to encourage professionalism. They were able to benefit from the new attempt at scaffolding their learning, attending a second reflective tutorial and discussion, and a second portfolio tutorial at which they gained experience in more complex pathologies and with entries in physics and WH&S. They had a tutorial focused on an assignment in their 'professional issues' unit of study during which class time was spent engaging with the criteria rubric and discussion on standards.

Focus Group 7 was held during an on-campus attendance (5 students) and two interviews were held once the semester had finished. With the researcher now much more efficient at and comfortable with conducting and drawing information from focus groups, fewer interviews were required to reach the point where little new information was gained. Similar questioning was conducted as for the previous groups, although there was

more emphasis on the new interventions. Portfolios of seven of these participants were investigated after their assessment at the end of semester.

The inclusion of the 'physics/artefact' example in the more advanced portfolio tutorial was met with greater success on this occasion. The 'physics' examples were more acceptable because the students had covered the 'artefacts' part of their physics course and now had sufficient scanning experience to identify for themselves how artefacts can mimic pathology. A number of participants commented half-jokingly that physics was still an area to be avoided! But now at least they could see the relevance and expressed the idea that if they had something interesting like the two scenarios they had for examples, they would now know how to write it up. The participants reported that the tutor had talked about an ethical scenario with the group to see how a portfolio entry might be created from it, but the participants had just finished a large module covering ethics theory and cases in ultrasound and so they felt they had exhausted the topic. Workplace health and safety for sonographers was also raised by the tutor, a definite concern for sonographers and for the sonographer professional body due to significant rates of work related injury. This was discussed with great interest but it was decided it would be a difficult area to include in a portfolio entry.

Conclusion

This chapter concludes the investigation into the iterations of the portfolio by proposing a compilation of the changes suggested by the research which would be continued for future cohorts of students. The next chapter will continue the research through an investigation of the participants who have graduated and are 12 months into their qualified work.

Chapter 7 Learning from Practice

Introduction

This thesis argues that portfolios provide assessment suited to the development of longer-term learning, and that a pivotal concept identified was enabling participants to translate learning into the workplace. Participants and their portfolios have demonstrated, in chapters 4, 5 and 6, that whilst in the university, learning skills tasks provide worthwhile engagement and insights. This chapter however looks at the crux of the matter, researching the participants in their first year as a full-time qualified sonographer in the workplace, to identify evidence of longer-term learning.

The last three chapters have described the addition of a suite of learning skills designed to foster longer-term learning to meet the needs of the newly qualified practitioner in early professional practice. As discussed, the participants found most to be useful during the course, with redesign efforts and support structures as described based on their feedback. This chapter then, is the next step, which investigates whether the strategies introduced relate to what is actually done once they are undertaking qualified practice. In other words, did this preparation for learning in practice result in continued learning in practice. To do this, the participants were interviewed 12 months post completion of their course about their continuing learning practices, and their responses were explored in three ways:

1. Direct questioning about their engagement in the mandatory continuing professional development (CPD) required to maintain professional accreditation provided an analysis of engagement in these formal requirements

2. Participants were asked what they had learnt in general since graduating, and this allowed the idea of learning in context to emerge, that is, learning skills additional to those covered at University that were available to them in their context

3. The interview data, and further data (as detailed in the section 'Sonographic Practices – An Analysis', later in this chapter) was analysed to identify the characteristics of sonographic workplace practices that encouraged continuing learning

The first two of these responses, the extent to which the portfolio prepared graduates for undertaking CPD and for new learning applications, will be analysed first, using once more the 'Evaluation: Broader Impact' phase of the educational design research method discussed in Chapter 3 and used in Chapters 4 to 6. The chapter following this one (Chapter 8) will discuss the analysis of the third response; the identified sonographic 'practices' and the implications of this for portfolio redesign for longer-term learning.

Graduate Learning Practices - Description

The participants involved in this aspect of the research were those graduates who had agreed to be contacted 12 months following the completion of their course for an interview. All were still working in the Department in which they had trained as students. In-depth interviews were held with four of these participants who have been termed the 'graduate' participants.

Graduates' Engagement with Continuing Learning

During their interviews, the graduates were asked about the ways they were continuing to learn now that they had finished their course. The interview questions covered two specific aspects of this, the first about fulfilling the formal continuing professional development (CPD) requirements needed now they were qualified, and the second about their

general ongoing learning in clinical practice since finishing the course. These are dealt with in the following sections.

Formal continuing professional development (CPD)

The requirement for evidence of formal CPD activities is a typical scenario for many health-related professional bodies to ensure their practitioners stay abreast of their field. In Australia, for example, the Australian Health Practitioner Regulation Agency (AHPRA) is the body which aims to ' … protect the health and safety of the public by ensuring that only health practitioners who are suitably trained and qualified to practise in a competent and ethical manner are registered' (AHPRA, 2015). They require all registered health professionals to undertake CPD.

All Australian sonographers are required to undertake CPD by their accreditation body, the Australian Sonographer Accreditation Registry (ASAR) in order to maintain accreditation to practice. To fulfil the requirements of the ASAR CPD program, 'sonographers must accumulate 40 CPD credits in each triennium' (ASAR, 2015). A triennium is a three year period and points are allocated for professional development activities such as attendance at national and international conferences and educational seminars (for which 1 credit point per hour attendance can be claimed), giving presentations, participating in research and so on. Sonographers must keep documentation of this activity and at least 10% of the membership, who are completing their triennium, is audited per annum. If the sonographer is unable to produce the evidence they can be removed from the accreditation registry and Medicare Australia are notified. This has serious consequences for their employment, so it is a non-trivial requirement.

The graduates interviewed had been alerted about their CPD requirements through a portfolio intervention in the third iteration, reported in the last chapter. The task was a component of the self-assessment intervention and read:

Explore your options as an Australian qualified sonographer for completing your Continuing Professional Development points, and conclude with a paragraph on which option you might take and why. (Clinical Practice – Professional Portfolio Guidelines, 2011).

As discussed in the last chapter, the CPD component was quite poorly done by most participants, and this was put down to a perceived lack of relevance, given participants were still in the thick of their course and this was something that did not concern them until they were qualified. The teaching team decided this was not a suitable inclusion for the portfolio and undertook alternate strategies to introduce students to CPD, which included having a representative of the professional body provide an informative presentation to students in their final on-campus block. Nonetheless, these particular graduate participants had been exposed to this instruction and three of the four had made attempts at including it in their portfolios (one, representative of about a third of the student cohort, had missed the instruction all together and had no such entry in their portfolio). All had updated their 'accredited student' status to 'accredited sonographer' status upon graduating and in doing so had again been alerted to its importance.

The interviews showed a range of levels of engagement with these requirements. Somewhat alarmingly for the researcher, two graduate participants had not yet worried about their CPD. One had claimed he had 'not had time' and was not concerned as he had another two years before his triennium was up, and felt that would be plenty of time to collect the requisite points. Another said:

I haven't done any CPD or anything ... in fact after … (finishing the course) … for almost 12 months I went out of my way to *not* do anything (int, graduate).

The other two graduate participants had started their formal continuing education; one had attended the annual Australian sonographers' conference and said she was pleased to collect a 'good number of points'. The other had taken the requirements on board quite seriously. She had attended one seminar, and had joined the health and safety committee:

> because I do health and safety committee, you get points for doing that … sometimes I'll read articles and then write a little summary of the article and sometimes I'll send it around (to the other staff).

She had also attempted a number of CPD crosswords (some of the professional journals contain a specified article to be read and at the back of the journal there will be a quiz or crossword, which can be completed to gain a point or two). This participant found them unsatisfactory:

> the crosswords that are on the internet, and the ones in the back of *SoundEffects* (professional magazine), that was too easy … the answers are just exactly how it's written.

More importantly, she discussed creating a 'CPD portfolio':

> … yeah I've got my own little CPD portfolio now, so I've got it all in order (with) a little Table of Contents and all that.

Asked if the portfolio at university had encouraged this, she agreed it had, and said:

> I really liked it to be honest, I found I learnt heaps that way, and even now if I had to do one, I wouldn't happily do it, that would be silly (chuckles) but I'd feel like it would be a worthwhile thing to do. 'Cause I don't feel like doing a crossword teaches me anything, you know … it doesn't … if that's what it's supposed to be for, the learning, then that's not going to teach me anything, but I think I would learn (more if I had to do a portfolio for CPD) … and I think it would be a much better use of my time … the time spent doing a

little portfolio entry on something I learnt that day, rather than ... you know, and if I had to do it I'd happily do it 'cause I think it's worthwhile. It's a good use of my time, and that's how I remember things.

This seems to demonstrate that the portfolio for longer-term learning had extended into this student's continuing learning as a qualified professional, and for her, it represented something that was a good use of her time and a good way for her to learn. From the perspective of the researcher, this was clearly a desired outcome and as such, it was important to check she was not saying this just to please the researcher. So the line of questioning was extended to check consistency. The researcher asked for examples of what had gone into her CPD portfolio. She responded:

Graduate: I did one, with er ... I think, with a subclavian steal (a rare pathology).

Researcher: Oh wow.

Graduate: 'Cause we don't get heaps of that, we may only get one or two (of that type of ultrasound) a day ... and I didn't believe it. I thought 'No, you've done something wrong, this can't be' ... so I got someone else in and they were like 'Oh!' And then I thought ... I'd forgotten all the vessels and where the lesion had to be to get the steal and then I looked it up and I read and wrote a few things on it … like it (the portfolio entry) ... so I could get my CPD points.

Researcher: Oh, very good! Do you actually have to hand in the writing to get them?

Graduate: No, um, I've just got it there if I ever get audited' (int, graduate).

This was followed up by a second example of an entry in her CPD portfolio in the field of vascular ultrasound, which she was excited to talk about as

she had just embarked on learning this subspecialty. It was assessed that her claim to be continuing with her portfolio into early professional practice was genuine.

Again then, there was mixed uptake of the CPD requirements. In Chapter 6, the third iteration, lack of concern towards CPD shown by the advanced students was attributed to the notion that as students, such a requirement was too far off for them to be bothered, given they were very busy with their course and (usually) full-time work. An explanation for those graduate participants who had not yet bothered could similarly be explained by the fact they felt the three year deadline was sufficiently far off as not to worry them at this point. But another explanation might be lack of concern, because they see no problem in achieving what will be required, and intend to do it anyway. The idea that professionals are interested in continuing their learning and do so without formal requirements, has been long standing: 'Over the past many decades, continuing professional development (CPD) has turned from acts engaged in by professionals for their own satisfaction to a systematized and codified set of activities …' (Boud and Hager, 2011, p. 17). For example, a retrospective survey of UK general medical practitioners (GPs) showed the majority would already comply with an increase in the number of hours of CPD posed by a new model of revalidation (Howard et al, 2009). And a survey of approximately one-third of all Australian sonographers who were members of the Australian Sonographers Association at the time, identified that while they strongly believed in a mandatory system for CPD, 'most also agreed that they did not need a mandatory system to fulfil CPD' (Phillips, 2010).

Learning skills

When asked about the learning skills that had been added to the portfolio, all graduate participants were convinced that they were useful and had had an impact on the way they thought about their work, but none had gone so

far as to continue to document it. An example of this was asking one of the participants about judgments:

> Researcher: Ok, so in those portfolios (you used to do at Uni), you were asked to write up any judgements you'd made, do you still think about any judgements or decisions you make in practice?
>
> Participant: A lot. Especially in breast (ultrasound) I think, you know, when you choose to ignore something, or think how am I going to take an image of this and make it be something? You know like with fatty entrapment and stuff like that, I often think ... that would be the most common time I think about it … it's a bit less stressful now, I get less stressed because when I'm making the decision I really do know that ... I'm sure it is fat ... and not a mass.
>
> Researcher: But how?
>
> Participant: Just sure, and that's with breasts where it's really quite hard to explain ... in words.
>
> Researcher: It is.
>
> Participant: And you can't say 'just because I get that feeling' (chuckles) but that's what it is like a little bit, it's just the way the fat merges in with the tissue and doesn't ... it kinda goes ... you know (waving hands).
>
> Researcher: I do know, I do!
>
> Participant: It goes 'blurp' (gesticulating).
>
> Researcher: Yes, I know exactly what you mean! (both laugh) … so do you write down that decision? For the radiologist?
>
> Participant: No, not now (int, graduate).

Again it was experience, discussed in chapter 6, that was what the participant was struggling to articulate. Her experience meant she had seen

a large number of that type of ultrasound, in all different types of patients, and repeatedly had to decide if a particular finding represented benign fat lobulations or a cancerous mass.

Learning skills that were the interventions in the portfolio were therefore useful whilst doing them as a student, and had continued into practice, but were no longer documented. Analysis of the interview data showed there was a great deal of ongoing learning in context however, which was coded under the theme 'contextual learning'. An example of this was the learning in breast ultrasound demonstrated above. It is further considered next.

Learning in context

While the sections above are illustrations of the learning encouraged (or not) by CPD requirements and the learning skills being transferred into qualified practice, there was also a great deal of learning happening that was not as directly attributable to the efforts to include longer-term-learning features into the portfolio. The participant above, for example, had consolidated her learning in breast ultrasound and had embarked on learning vascular ultrasound as a new subspecialty. The other three participants all nominated areas of learning in which they had developed new competencies and in which they were now confident. These were all applications of ultrasound they were able to access because of their working context, and were able to gain experience in because they were no longer required to concentrate their efforts on the applications required by the course and for accreditation purposes. This was demonstrated in the following exchange with one of the graduate participants:

> Researcher: So what's changed now you are no longer a student?
>
> Participant: I no longer have set things I should be learning, like, you know you have to learn obstetrics, so it's a desperate thing, you have to get every obstetric that walks through the door, yeah, so I don't have to learn things at a certain time, I can do it at my own pace

now, which I am … yes, I'm happy to do a morph
(morphology obstetric scan), but we just don't get
that many any more, but I am usually the one to do
it if there's no students around, fighting for it... (int,
graduate).

Another participant had continued with musculoskeletal ultrasound (MSK)
and when asked what she had learnt since finishing the course said:
Oh well, not much at all; I do a bit of MSK, just the easy stuff …
knees and Achilles tendons and, sort of legs, but I don't really do
anything ... Oh, I'm starting elbows, but I'm just avoiding
shoulders ... I need to stop avoiding it, I just don't want to
(laughing) (int, graduate).

Even the participant quoted above, who had gone out of his way not to start
any CPD activities, had nonetheless not only continued to learn but had in
fact learnt a number of new applications. When asked about it, he said:
…like (doing ultrasound of the) knees now ... I started to learn all
the stuff and all the anatomy and I learnt ankle, and elbow ...
once you start learning them all ... (it gets easier) (int, graduate).

So workplace learning was happening as the opportunity or necessity arose
because it was a type of ultrasound examination routinely performed in
their context, and comments like 'I started to learn … all the anatomy …'
implies the underlying pattern reflected learning at the university, where
the anatomy had to be understood first, in order to recognise the ultrasound
appearances.

Continuing Learning 'Practices' Identified

In chapter 3, a view of learning as a social activity was presented, using 'the
practice turn'. Commonalities were drawn from contemporary practice

theorists' writings, including Schatzki (Schatzki et al., 2001; Schatzki, 2012), Kemmis (Kemmis, 2009), Gherardi (2008) and Fenwick (2012). It is a view that knowledge and learning occur through action and interaction with social practices, and contrasts with the ideas of learning as being predominantly an individual activity of the mind, based largely in reflective activity, or as something transferred from teacher to student. So in order to investigate the interviews for 'learning practices' that participants undertook once in practice, it is first important to look at what the features of a practice are. Practices incorporate Schatzki's (2001) 'sayings and doings', and are identified further as embodied, materially mediated, relational, situated and emergent. Each of these practice features is further explained below.

Schatzki's (2001) ideas of practices as 'organised nexuses of activity' conceive the basic activities of a practice as the 'sayings and doings'. Sayings, or discourses, are words and thoughts, and are a subclass of doings. 'Basic activities take place without the actor having to do something else: they are actions a person can perform without further ado. Examples are typing on a keyboard …' (p. 15). Dahlgren et al (2009) describe doings as 'how people act and interact in physical and material space-time' (p. 186), alerting us to the wider scope of doings. Schatzki (2001) goes further to say these are organised by a 'pool of understandings, a set of rules, and a teleoaffective structure' (p. 58), as explained in chapter 3. For the purposes of this chapter these ideas will be encompassed by the term 'sayings and doings'.

Features of a Practice

A strong theme in the practice literature is that practices are necessarily embodied. Schatzki (2001) argues that even a person with paraplegia is capable of a range of embodied practices, as they can perform a limited range of doings and are capable of the full range of sayings in the form of thinking, calculating and imagining (p. 15). Kemmis (2009) holds that

embodied practice is what people do at a particular place and time, and provide a person with identities and a sense of agency (p. 23). Practices are seen as 'materially mediated' in that they acknowledge the interrelatedness of the tools, technologies, bodies, actions and objects, which 'helps to avoid putting human actors and human meaning at the centre of practice' (Fenwick, 2009, p. 69). It thus avoids treating material things as mere appendages to human intention but as central. The centrality of the ultrasound machine to the professional practice of sonography is a good example, as without that materiality there would be no such profession.

Practices are seen as relational, that is, the practice is realised in relationships between people, groups of people, places and objects, and matters it includes and excludes. In learning that provides quality health care for patients, Dahlgren et al (2009) talk about practices, such as interprofessional learning, as relational: 'Knowing what other professions can contribute to help becomes as important as knowing the repertoire of a particular health profession.' (p. 194). Practices are also 'situated', that is, they occur in particular settings. They are situated in the body, in the dynamics of interaction, in language (discursive practices) and in physical contexts. Gherardi (2008) gives the examples that trained bodies have incorporated a particular expertise that can be brought to bear in particular situations, and that through the body, practitioners can develop a professional vision (p. 521). The dynamics of interactions in practice with people and materials convey meanings and constitute emergent knowledge. Situated practices depend on unstated assumptions and shared knowledge for the mutual achievement of sense (Gherardi, 2008, p. 521). Practices are also always emergent, that is, 'they evolve over time and over contexts; they change in the light of circumstances (Rooney et al., 2014, p. 270).

Sonographic Practices – An Analysis

The interview data therefore was interrogated for evidence of learning practices that encapsulated each of these ideas. Five themes emerged that offered possibilities for sonographer workplace practices and each was investigated through a practice theory lens. The five themes to emerge were: the sonographer's worksheet practice, the interesting case, the film library, the staff meeting and the second opinion. Upon investigation, all but the last of these were analysed as fitting 'practice' conditions. Each of these practices resonated with the researcher's many years in the profession, however, mindful of the trap to wish them into being because of this, and as there were only four interviews with graduate participants, these potential practices were re-analysed against the 'advanced participants' data (interviews and portfolio entries) for confirmation of the themes, as these participants had been working as student sonographers for approximately 18 months. An explanation of the features of practices, and these potential sonographic practices, were then provided to the teaching team by email and discussed at a meeting. They were also discussed with three senior practitioners with extensive experience in clinical supervision of students. None of these senior academics or sonographers was familiar with practice theories, so meetings were arranged where further explanation or clarification was sought. The academics and practitioners enthusiastically produced many examples of their experiences with these sonographic practices during the discussions, and the potential for improving teaching by bringing them in to focus was immediately grasped. As mentioned, four of the five themes were verified as characteristic of practices of sonographers in the workplace. The next section explains how each theme emerged from the graduate participant data, and provides a short explanation of its context and in the ways it fits (or not) the features of a practice.

Practice 1 - Sonographers worksheet practices

This practice involves interactions surrounding the sonographer's worksheet; typically an A4 pro forma completed by sonographers after an ultrasound examination to provide the reporting radiologist with information beyond what the images produced can reveal. It might contain notations such as the patient's relevant clinical history, comments about the technical aspects of the examination, summarised measurements and the sonographer's interpretation of the findings and/or differential diagnoses (see Figure 5 below for an example of a thyroid ultrasound worksheet). The radiologist views the Worksheet along with the films as the final report on the examination is composed. Worksheet practices are conducted through varied discussions and embodied activities. The theme of 'worksheet' (meaning sonographers' worksheet) was a strong theme across the data that was involved in learning. A typical graduate participant comment was:

> Researcher: So in those areas where you have extended your expertise, like, further than we taught at Uni, how do you go about doing that?
>
> Participant: For starters, one of the doctors said read what's on the worksheet and make sure you tick the boxes and that's pretty well that … and I went and watched several the same way as I learnt previously ... and asked the guys about what sort of comments go beside the boxes … (int, graduate).

There were also portfolio entries from advanced participants singling out worksheets, such as this representative example taken from a participant's 'self-assessment' entry discussing what quality means to them:

> Sonographers should also be capable of documenting on worksheets their findings. These include additional patient clinical history not mentioned on the referral, description of the pathology found if present, possible differential diagnosis, and whether further testing should be recommended. For example ….
> (information about sonohysterography exams) … in this situation,

'quality' also involves being able to communicate the findings to the physician on site (pf, advanced).

The Worksheet encapsulates what sonographers do routinely after each ultrasound examination and is so well recognised in the profession that one professional body has collected exemplar worksheets which are available to its members. The time and care taken to complete the worksheet depends, for example, on whether the report will serve as preliminary findings to go in a patient's hospital/surgical notes, or whether a 'normal' exam has become so routinized that all that is required is a couple of computer keystrokes on a digital form of worksheet. Worksheets vary depending on the body part examined, the context and the workplace, and can reflect differences in departmental specialisms, for example, the worksheet for a carotid ultrasound study may look very different in a radiology practice compared to a vascular surgery practice. Nonetheless all the teaching team and consultant sonographers readily recognised the sonographers' worksheet as a professional practice. An example of a simple thyroid ultrasound worksheet is seen in Figure 5.

THYROID ULTRASOUND   REVISED JUNE 2011

PATIENT STICKER   History:

AGE:

Ultrasound Findings:

                      RT LOBE   LT LOBE

        x   x   =   cc   x   x   =   cc
                normal range   4 – 12 cc   (+ 1cc each decade after 55)
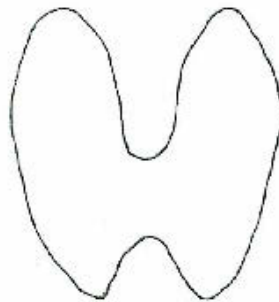
Nodules   **Impression**

Hypoechoic   MNG
Calcification   Not Worrying
Irregular/Lobulated   Worrying – FNA
Tall>Wide   Needs Scan
Central Flow   Suspicious for Hashimoto's
Jugular Nodes
Colloid Artefact
Simple or Colloid Cyst
Spongiform
"White Knight"
Hypervascular
Many Similar Nodes
No Suspicious Features

Technical Comments:

   Sonographer

Figure 6 Typical Thyroid Ultrasound Worksheet

To verify the worksheet as a practice, its features were assessed against each of the requirements of a practice, as documented in the table below.

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Table 7 – Analysing the Sonographer's Worksheet as a Practice

Practice 1. Sonographers Worksheet Practice

Sayings and Doings:

The most common sayings are discussions between the radiologist and the sonographer during or following the examination, but a worksheet may also be discussed with other sonographers, for example, a senior might help a junior with advice on its completion, or it may be discussed with a new employee at induction to show them the normal routine. It might be raised in discussions to draw attention to an improvement that might be made or new research that should be incorporated into the examination. It is updated periodically as new protocols and policies come to light. The doings surrounding the Worksheet include writing or drawing on the pro-forma, performing the examination according to rules, protocols and norms, scanning it into a computer system and all the accompanying activities that make sense around it.

Embodied:

Completing the worksheet usually involves interaction with the patient beyond just using the ultrasound equipment to scan, including information from discourse about their symptoms and their clinical history, information from embodied contact such as palpating a lump or making a visual or clinical examination of the area of interest, and these all operate within particular social and cultural contexts. A sense of agency or ownership or professional identity might be conveyed in the assertions of having 'found' pathology, or arguing that something on the film is an artefact rather than 'real' due to the physics of ultrasound, or advocating for a patient in certain circumstances.

Materially mediated:

The Worksheet Practice is embedded in the use of the ultrasound machine and its associated equipment, the scanning room, examination bed, scanning gel, film-producing equipment, administration and reporting systems, as well as the actors with which they are ensconced: sonographers, patients, radiologists, receptionists, ultrasound service engineers, referring doctors, typists, transcriptionists and others. The recording of measurements, indices and comments on anomaly/abnormality occur within a background of routine 'normal' measurements, protocols and policies such as Medicare rebates. These material things influence the practice, for example, a new transducer design or a new functionality of a machine may enable new or different measurements or observations to be made, resulting in a change to the Worksheet that reflects this. The materiality can and does change this practice.

Relational:

Worksheet practices are relational in that each instance will be different depending on what the individual sonographer brings to the episode of writing up the worksheet, their experiences and history in relation to this episode. Worksheets may be completed differently for different radiologists and for different subsets of pathological conditions.

Situated:

Creating a worksheet for each examination is a situated practice in that it reflects the individual culture of a particular department. The time and care taken to complete the worksheet for example, depends on whether the report will serve as preliminary findings to go in a patient's hospital/surgical notes, or whether a 'normal' exam has become so routinized that all that is required is a couple of computer keystrokes. Worksheets can reflect differences in departmental specialisms; for example, the worksheet for a Carotid ultrasound study can look very different in a radiology practice compared to a vascular surgery practice. Regardless of this, the worksheet supports the radiologists' reporting practices or the surgeons' surgical practices and their interaction with sonographers.

Emergent:

Worksheets are an emergent practice in that 'they have a history within … [the] profession but they change over time, with contexts, and in the light of circumstances' (Rooney p275). Worksheets may change when departments merge and two versions of a worksheet are revised to suit the new combined workforce, understandings are shared and the practice is revised to suit. New staff may bring different views or new skill sets to a department, creating the need for revision of a worksheet or even creation of a new one (e.g. a new biopsy procedure or Doppler examination).

It can be seen then that the Worksheet fits well within the features of a professional practice for sonographers.

Practice 2 - The interesting case

In most instances, the purpose of an ultrasound examination is to detect and diagnose pathology. Having said that, many types of scans are repeated many times and become routine and normal. The 'Interesting Case' is one that demonstrates an unusual or rare pathology, but could also be an outstanding or unusual finding of a normal anatomy or anomaly or involve an interesting pathological appearance (e.g., a rare type of leg ulcer). In

everyday practice, interesting cases of all varieties might crop up once or twice a week, and generate interest from all staff in the department who might gather around a light box or monitor to look and learn and participate in this practice.

The theme of the 'interesting case' was encountered in all four interviews, with participants keen to relate their most interesting case to the researcher. As such it was considered for inclusion as a practice. An indicative graduate participant comment in an interview went:

> Researcher: You said (last interview) at work, some people go out of their way to show you new pathology ... do they still do that? Now you're not a student?
>
> Graduate: Yeah ... they still do but not as common ... they sort of don't direct it to a specific group but to everyone, including the radiologists ... they'll say 'oh wow, look at this'.

And again, asking an advanced participant about the portfolio:

> Researcher: Do you think you'd have done that (researched in depth into a pathology) if you hadn't had to do a portfolio?
>
> Advanced participant: No, I wouldn't … I would have kept the interesting cases, we do that at work, talk about interesting cases, a lot … but not to the extent (that I would have for a portfolio).

The Interesting Case is a familiar entity in sonography and in most medical and allied health professions. The discussion of an Interesting Case has a long history in medicine, and it has parallels with medical 'grand rounds' or case meetings. Case studies are a familiar feature of continuing learning events, conferences and health journals, where they will have been elaborated and researched, but the practice here is the Interesting Case

that pops up in daily work. A detailed analysis of the practice features of the Interesting Case, as done above for the Worksheet is provided as Appendix 8, however a brief description follows. This is done also for the remaining two practices.

The saying and doings surrounding the Interesting Case as it happens in everyday practice might include, as indicated above, someone saying, 'Hey come and look at this'. As radiology workplaces are typically open and patients move past them regularly, it is mostly a reasonably quiet announcement to ensure privacy. It is often sonographers and their students but also different professional groups, for example it could be sonographers, mammographers and radiologists discussing an interesting breast finding. It involves movement, which could involve creating a space around a monitor so all can see and involves pointing to specific features of images. This practice may have a number of purposes such as seeking professional input, teaching or raising awareness.

It encapsulates what sonographers recognise as routine from their day-to-day practice and from their higher education experience of exposure to many such cases during their university programs. Those involved bring their bodies, backgrounds, professional perspectives and previous experience to bear. The professional identities of the health professionals involved are reaffirmed and enhanced. Each instance of the practice and its outcomes are shaped by the particular people involved. It is materially mediated in much the same fashion as the Worksheet, but may also include missing materialities such as images that should have been taken as part of the case or patient information that could have been gathered. The opportunity to engage in the practice of presenting the Interesting Case is dependent upon the relations at play as the practice is 'embedded in sets of dynamic social interactions, connections, arrangements and relationships' (Rooney et al., 2014, p. 274). It might be undertaken or not depending on the interests or expertise of the particular professionals at hand, or the presence

of a student, or because of past positive or negative emotional experiences from initiating or participating in it.

The interesting case is a situated practice, in that 'like any other social process (it is) situated in specific contexts of power/knowledge … depending on unstated assumptions and shared knowledge for the mutual achievement of sense' (Gherardi, 2008, p. 517). Thus initiating this practice might be situated in surrounding conditions such as whether time pressures prevent it happening. For example, in busy private practices where time is at a premium workers may be less likely to undertake the practice during the working day but might defer it to a weekly or monthly meeting, on or off site. In a hospital setting where the patient's course of care is likely to be directly influenced it might happen instantaneously. It is a continuously emergent practice due to the development of new equipment, technology and research into disease states. A new approach to workplace practices might emerge from an interesting case as sonographers might extend their examinations, radiologists might review films differently or report the absence or presence of something. An interesting case often creates a new challenge for sonographers, leading them to find new knowledge, skills or dispositions.

Practice 3 - The Film Library

In many sonography departments, a more or less formal 'film library' of interesting cases can be found. In the informal case, it has often been started by an enthusiastic sonographer and may be their personal collection, or may be a compilation, added to, over time, by others. Sometimes it is just a pile of films in a drawer that may or may not be accompanied by the sonographer's worksheet and/or the radiologist's report. Occasionally it is a more formal library type shelf and the films are filed in film bags, which may have some sort of systematic numbering. On PACS systems it may be digital, and called the 'film library' or the 'teaching files'. They may demonstrate examples of pathology, artefacts, false positive or negative scans and so on.

The idea that a 'Film Library' might be a practice was raised by two of the graduate participants, but the most illustrative example of its use arose in a discussion with advanced participants in a focus group, as the researcher asked about collecting content for their portfolio entries:

> Advanced participant 1:   For the portfolio I just got into the habit of printing everything that was interesting … like printing a copy for myself of everything that was interesting … I created my own library … (some discussion about electronic formats here)

> Advanced participant 1:   Like if I find a case that's interesting I'll take images of it and keep it for myself, and even other people at work do the same thing … create their own library.

> Advanced participant 2:   Yeah we do that for the library at work but not really for ourselves.

> Researcher: Does that mean it's good for the workplace or do they do it anyway?

> Advanced participant 2:   Well they only just started doing it …

> Researcher: Because you had to (collect cases for the portfolio)?

> Advanced participant 2:   Yeah, and because we had a new lady came on and she created a library where she was before, and she does it wherever she goes … it's been really good (fg, advanced)

Samples in the film library may have been used, when current, as the Interesting Case, then put in the library for future use. The film library may be used for teaching students, practice assessments, and so on. A special case is the equipment fault film library; this is a special collection of films to show to service engineers or applications specialists, which may include film production faults, transducer faults, imaging anomalies such as electronic noise, etc. These images of 'small' faults are collected leading up to the

routine maintenance service call and will be brought out and discussed with the engineer and various staff before or during the machine service.

The sayings and doings around the film library are often related to teaching. A senior sonographer may use films from the library to quiz a student, for example if they are coming up to an exam, or it may be a scheduled tutorial. The doings around the film library include collecting, de-identifying and filing films, or renaming and sorting digital files on the PACS. When accessed for teaching, these must be retrieved and displayed, and can range from a single sonographer and student, to a film reading session involving all the departments' staff. The practice of collecting for the film library, sorting through it for items of interest and using these with others in a teaching setting is embodied in a similar way to the interesting case but this represents a cross section of results from all imaging modalities and may include followup CT scans, MRIs, PET scans, etc., which themselves involve practitioner's bodies coming in contact with patient's bodies and the histories of those bodies. It is professionally embodied in that it provides a sense of teamwork and identity for the professionals involved and a sense of creating a quality work environment through caring about quality and patient outcomes.

The film library is mediated by materiality of the films, film production, digital image collection and storage facility, protocols, working histories, and the culture of film collecting and teaching in a particular site. The selection of films from the library for teaching can be mediated by corporate memory of past findings, critical incidents such as missed diagnoses, etc. Arrangements from the film library such as tutorial sessions and relationships such as formal designations of tutors and students who use the library stem from the 'myriad ways' (Shatzki, 2005, p. 474) that practices are relational.

The film library can be understood as a situated practice, in use in particular settings such as work areas and tutorial rooms. It is situated in time, for example its use may be prompted by a quiet time in the working day or prompted by events and understandings (e.g., understandings of the roles of tutor and student, of past experiences, of jargons or terminologies or of consequences). The film library, through its teaching role, supports and informs practitioners' practices. Film libraries have a history in the profession. One example is a beautifully catalogued collection of ultrasound teaching films covering an entire wall of a sizeable meeting room at a large metropolitan hospital in Melbourne, Australia from which it was possible to choose films for examinations of sonographers in the early days when only a professional body qualification was available. Similarly, in the teaching program at the centre of the research, boxes of films arranged by anatomic part are used for tutorials and the teaching team might seek to supplement these by visiting sites with particular expertise, or clinical supervisors or past students may make donations of such collections for use in the course, thus they are emergent in both content and in intent. The portfolio assessment in the course represented a film library (with added information) to some of the participants interviewed.

Practice 4 - The staff meeting

At routine staff meetings, sonographers and other workers discuss workplace issues as team members in a particular setting. Sonographers may be involved in discussions about administrative practices like appointment making and Medicare rebates, and the consequences of these on the way ultrasound examinations are carried out, for example, that examinations on the abdomen and the pelvis of the same patient cannot be done in the same day or one will not attract the Medicare rebate and the patient will have to pay for it. They may be involved in discussions around how what they do impinges on the radiologists, radiographers, referrers, administrative staff and others. Staff meetings might occur regularly, for example, fortnightly or monthly, or on an ad hoc basis. There is usually a

number of different staff in attendance, depending on who is 'rostered on' (or off). Even if they were not physically present, staff may still engage in discussions or ongoing actions from the Minutes of the meeting (often pinned up in the tearoom or put on the intranet).

The graduate participants made mention of staff meetings as a place they became aware of wider issues that impacted their sonography work, and this idea was explored as a potential practice with much wider implications. While a 'typical' quote was not made, one graduate participant, when talking about the difference between being a student sonographer and a qualified sonographer said:

> because you are qualified I think it's better (referring to a staff meeting) ... the surrounding staff automatically accept you ... and you find out things like when they talk about the (Medicare) rebates, so for MSK (musculoskeletal ultrasound) the radiologist is supposed to come and look ... now I don't feel so bad about putting a bit of pressure on them to come and check (int, graduate).

The sayings and doings of a staff meeting are unique to the context but will be familiar to most workplaces and might involve the organiser arranging people to attend and asking for items for the agenda. It might include setting up a table and seating, there might be refreshments provided, there may be someone chairing and someone taking minutes or it may be less formal. There are people representing the jobs of all the different staff in the workplace talking, discussing, interjecting, and resolving to undertake future actions. It is a more or less routine activity for many sonographers, occurring in particular locations at particular times. Most participants are physically present, and most people's roles are well defined. A physical space is required along with a table, chairs, computers to record minutes and other material requirements. It is also mediated by the requirements of new policies and protocols emerging from governing bodies, research

findings, budgeting imperatives, new equipment and so on, any of which may impact on the department and any aspect of a sonographer's practice.

Staff meetings are relational in that each professional might bring issues to bear that impact on those in different professions. For example, recent changes to government rules for knee ultrasound have limited the rebate to a few select medical indications. In one practice, when this was raised at a staff meeting, it was decided that a sonographer must assess all requests for knee ultrasounds before the patient was booked in for a scan. The practices of the sonographers and the booking clerks have thus changed in relation to one another. Staff meetings are situated in particular social, political and cultural discourses involving personal agendas, values and past experiences. The interactional dynamics of the meeting and the personalities involved may influence the outcomes of the actions taken. The purpose of the staff meeting is generally to ensure a smoothly functioning workplace that complies with changing imperatives. Each staff meeting carries with it the emerging actions of the last, and of the collective experiences, and creates further actions based on these.

Potential practice - The second opinion

A second opinion is well recognised in many professions, particularly in medicine. It involves obtaining an opinion from a second professional practicing in the same field usually for the same condition or finding.

In the interview data, the graduate participants mentioned instances of asking for a 'second opinion' or 'some help', now that they were qualified, in the context of comparing qualified practice with being a student. One participant talked about getting others to come in the room to see the patients' problem for themselves, which now that she was qualified, had changed from being her supervising sonographer to the rostered radiologist:

> … the only times I've missed things is when I knew I didn't feel
> happy with it, and I've got the radiologist to come in, cause the

sonographers generally don't want to come in now, they say you just go straight to the doctor cause we might have to get them in as well. They're all really good like that … now (that she's qualified) they don't want to come in cause they think well if you've missed something we're not going to see it so, cut out the middle man I think (int, graduate).

It was discussed with the teaching team that the seeking of a second opinion or help, might occur more or less frequently, depending upon level of seniority, for example students and new graduates asking for help with increasingly complex studies. Or it may depend on the level of novelty of a particular application of ultrasound, that is, even an experienced sonographer learning to perform a new skill or a new application of ultrasound, might need help as they encounter findings new to them. Upon analysing these things against the various features that construct a practice, however, it became apparent that it was mostly an individual encounter rather than a social interaction involving more than two people, and thus did not fit the notion of a practice.

Conclusion

The identification of these four workplace practices represents the first analysis of workplace practices of sonographers that foster learning from a contemporary practice theory viewpoint. Identified initially from searching for characteristics of continuing learning experiences of the graduate participants, they were confirmed by the data from the advanced participants who had been working in the field for 18 months. They were then further explored by the teaching team and crosschecked with experienced clinical supervisors. They carry significant implications not only for the portfolio task that has been developed but also for pedagogical practices across the curriculum. This will be further explored in the next chapter.

Chapter 8 Discussion

Introduction

This research has addressed concerns about students' continuing learning following their university professional preparation program. Recognition of the importance of further learning is needed to encourage them, as new graduates in the workplace, to be self-sufficient once the formal structures of their program have ceased. The four foregoing chapters, chapters 4 to 7, have outlined the empirical work of the thesis to these ends, and the aim of this chapter is to draw the findings together and elucidate the ways in which they answer the research questions. The overarching questions developed in chapters 1 to 3 were:

In what ways can portfolio assessment be used in higher education to develop learning skills during a course which subsequently foster longer-term learning in early professional practice?
and

What are the workplace practices that foster significant learning in early qualified practice?

These questions will be addressed, from the empirical findings of the research, in this chapter. From these initial questions, however, a subset of five questions about each learning skill intervention was applied to the portfolio. Each of these had two components. The first was relevant to participants while they were students in the course and this has been addressed in previous chapters. The second component required consideration once the participants had graduated, and this is addressed in this chapter. The subset questions are revisited again here:

1.   In what ways can the inclusion of a portfolio task asking students to demonstrate evidence of independent learning help raise awareness

and ability to learn independently during a course and after graduation?

2. In what ways can the inclusion of a portfolio task asking students to describe a judgement, help with judgement making, as students and as they start to make independent judgements in the workplace?

3. In what ways can the inclusion of a reflective task, asking students to analyse prior work and reflect on its implications for future learning, help them to be reflective practitioners both during the course and after graduating?

4. In what ways can the inclusion of a self-assessment task, asking students to assess their own work and reflect on its implications for future learning, help them improve their work during the course and to assess their own work after graduation?

5. In what ways might asking students to demonstrate their own competence help them with gaining competence during the course and in unfamiliar tasks in early professional practice?

This chapter will bring together the research findings under four themes. Firstly, the 'graduate' component of the learning skills interventions researched in chapters 4, 5 and 6 will be discussed. Secondly, strategies for portfolios' use to promote longer-term learning will be covered. Thirdly, ideas about identifying workplace learning practices of new graduates through a practice theory lens are considered. Fourth and finally, implications for academic development are considered, given the intimate and interwoven involvement of the researcher academic and fellow teaching team members in the research program.

Learning Skills for Longer-term Learning

In chapters 4, 5 and 6, an iterative approach to portfolio design enabled a cycle of initial research, improvement and then further research, into those features participants found supported their learning. Five learning skill

interventions, which aimed to foster longer-term learning, were scrutinised; independent learning, judgement, reflection, self-assessment and the demonstration of competence. Each is picked up here, related back to the research questions posed, and the implications for the new graduate discussed.

The skill of independent learning was researched by asking participants to include in their portfolios an incident that demonstrated evidence of independent learning. As demonstrated by the findings in chapter 5, the capacity to research and learn independently was apparent in portfolio entries even prior to this intervention, possibly due to the postgraduate nature of the participants who were the focus of this research. However, these skills were enhanced as the participants learnt about the nature of independent learning and through awareness of its importance, and due to the necessity of doing a task that engaged them in considering it. The outstanding finding to emerge, though, was that in these participants, independent learning fostered confidence, and as confidence and the self-esteem it brings are important, as explained in chapter 5, to further learning, this finding was fed back into the portfolio design and was the subject of more nuanced support. Further, the research found that those areas in which particular strengths were reported in the participants' portfolios, were those in which they had performed sufficiently consistently to allow their confidence to build.

Following graduation, independent learning skills fostered longer-term learning through further contextual learning, that is, further disciplinary learning available to participants in their particular workplace context. In the research setting, this meant the ability to independently seek the knowledge and resources to perform additional sonographic examinations to those taught at the university (those that were the subject of the most intense development due to the requirements of the professional accrediting body).

The research thus found that ways in which the independent learning task fostered longer-term learning was by asking participants to provide evidence of independent learning and providing scaffolded support to assist them. Further, including such a task in a portfolio assessment is fruitful in building students' confidence to undertake learning both during and following their course. As confidence is crucial to learning, it is important that it was developed during the course and that it continued into qualified work in the areas of continuing and contextual learning. These findings resonate with Eva and Regehr's (2005) contention that 'in daily practice, having a clear and accurate sense of one's strengths allows the professional to act with appropriate confidence' (p. S46).

Research into portfolio tasks asking participants to examine a judgement they made in practice, and to perform a self-assessment of their work, both identified experience as a necessary prerequisite. Participants' level of certainty in their judgements, and their abilities to self-assess, developed in depth relative to their experience with each particular area they encountered. With less experience they tended to report on disconnected incidents, but with more experience they moved on to more holistic views of professional encounters. The intensity to which the theme of experience recurred led to an in-depth analysis of what the participants meant by the term and of the literature on experiential learning. This included the need for novices to perform a task repeatedly and with input from supervisors and colleagues in order to do what is needed to get on with the job. It also included constant exposure to the variations of the appearances of many of the subtle variations possible, increasing exposure to less routine occurrences and finally, familiarity with rare instances. This allowed participants to progress to an advanced stage where their expertise allowed more independence in their work.

The method of applying educational design research allowed further examination of experiential learning. The researcher briefly outlined the development of this area in the literature to the teaching team, and proposed they review the work of Fenwick (2000). This review led to increased awareness of ways to help students, which would be fed back into teaching in a further iteration. In subsequent work, Fenwick (2007) contended that 'Experiential learning is arguably one of the most important contemporary areas of scholarship … (and) … remains significant in educational research and practice … (and challenges) … prevailing orthodoxy that worthwhile knowledge … and … legitimate education is planned and monitored by professionals.' (p. 530). The research questions relating to judgment and self-assessment posed at the outset then, of ways in which these skills made a positive contribution during and beyond the course, included raising awareness and consideration of issues the participants might not otherwise have encountered. It also clearly raised the significant effect of experiential learning as detailed above.

Reflection was another learning skill intervention added to the portfolio. Participants raised the idea of reflection independently at an early point in the research, given many had experienced reflective journals in their prior undergraduate degrees. Given the mixed feelings expressed by the participants towards this activity, members of the teaching team experienced at teaching reflective practice decided to introduce the concept formally and with support at a time which ensured participants had sufficient experience to reflect back to earlier cases. All members of the teaching team became aware of the difficulties associated with teaching reflective practice through the discussions undertaken, and the fact it needed to be carefully managed during the course.

The research identified that the major way the reflective portfolio task helped participants learn after graduation was through raising awareness of its efficacy for continuing learning. More significantly perhaps, was the

research finding gained through the theoretical understandings developed by the educational design research approach, that scaffolded support led to improved ways to facilitate the task. In particular, the idea of scaffolding was developed for reflective practice and it filtered through to other aspects of the program, as discussed in chapter 5. This became an important concept for the teaching team and was subsequently considered for each of the learning skills (see chapter 6), keeping in mind Wilson and Devereax's (2014) caution that: ' … it is the *nature* of support that is crucial to the notion of scaffolding. Support is valuable to students only when it leads to development, and ultimately, to student autonomy' (p. A91 – A92).

The final learning skill to be introduced as a portfolio task was one that asked students to demonstrate their competence in particular areas. This stemmed from concerns that students may become dependent upon others to assess their competence, rather than taking on the responsibility for it themselves, particularly in early qualified life. Being unaccustomed to this concept, the research found disparate understanding by the participants of what the task required, from complete disengagement to overconfidence. The research thus led the teaching team to re-envisage their pedagogical approaches to raising awareness in students about how to assess competence through support, resources and scaffolding.

The research findings identified that further work would be needed to answer the research question. In sonography, as in most areas of professional practice, numerous subsets of activities require competence, so this broad statement neglected to take into account the complexities of professional practice.

To summarise, each of the five learning skills interventions required scaffolding and support to enable all participants to implement them effectively. Table 5 from chapter 6 showed how these would be implemented for a future iteration in this context; however, it was possible to draw from

this some implications as above for incorporating learning skills into a portfolio assessment. In graduate life, these skills continued to provide assistance with contextual learning. As the learning skills were incorporated into the portfolio, and as the aim of the portfolio was to foster longer-term learning, the research findings for this broader concept are discussed next.

Portfolios for Longer-term Learning

Mindful of the fact that empirical studies are necessarily context dependent, the research raised a number of portfolio design implications that may be more widely applicable or of some use in different professional contexts. In chapter 4, an existing portfolio was studied for those features of portfolio assessment that the research participants found to effective in supporting their learning. The major feature identified was continuous engagement. This was also seen throughout chapters 5 and 6. Further research findings included the induction process, the necessity of scaffolding support and the benefit of portfolios as an evidential base of achievement.

The research found that participants identified the continuous engagement required by weekly portfolio tasks as a significant benefit, allowing them the ability to review and reflect upon work to improve it and gain confidence through their evidence of achievement. Hattie's (2009) meta-analysis of effective teaching strategies identified time on task as a primary factor in academic achievement at school level. This analysis of the portfolio activity provides abundant illustration that time on task is also effective in higher education. While it is unsurprising that a portfolio requiring weekly entries will encourage time on task, this research showed that a portfolio assessment requiring participants to engage weekly in learning tasks of interest to them from authentic practice examples and asking them to correlate it with theoretical concepts, proved to be an embedded, persuasive way of getting students to engage.

While the impact of other assessment tasks has to be sensitively managed, with a modicum of flexibility built in, this constant commitment to finding a case of interest every week, thinking about its significance, researching it and writing it down meant that students built up, over 2 years, an impressive collection of achievements. This made it possible to track progress, reflect on quality and create a useful reference tool over time. Engagement in their studies has been linked with success in higher education, as discussed in chapter 4, and the implications for portfolio design are that a consistent requirement to demonstrate achievement is beneficial. This is particularly so when incorporating learning skills in the portfolio entries, which builds an evidential base useful for longer-term learning.

The need for good induction processes for students new to portfolios was clearly identified by the research findings as discussed in chapter 4. The findings also provided ample empirical evidence for the assertion by Van Tartwijk et al, (2007) that clear identification of the goals of portfolio assessment is required. The empirical evidence also showed that a lack of induction processes tended to lead the participants to look somewhere other than the university for support, sometimes leading to examples of questionable suitability. This research showed induction needs to be responsive to the past experience of students and at a level suitable to novices. It also found the need for activities which engage students in commencing a portfolio, identifying the goals to be set, and involvement with marking criteria and expected standards. In the context of this research, tutorials were added to support this engagement, and while the addition of tutorials may not be appropriate or desirable in other programs, the implications of these findings are that students need to actively work with others to make sense of stated goals and applicable standards to start to work effectively within the portfolio. The role of exemplars has been critiqued recently, for example, Wimshurst and Manning (2012) provided

students with an exemplar marking activity with the aim of providing students experience in understanding criteria and standards to enhance their ability to judge 'conceptions of quality in complex pieces of assessment' (p. 452). Sadler does point out that students generally: '… need planned rather than random exposure to exemplars, and experience in making judgments about quality' (Sadler, 2010, p. 544). Regarding induction then, successful introduction of portfolios need engagement with goals and standards and may benefit from social activities associated with them.

Along with induction, scaffolding tasks so that they were progressively achievable but increasingly more challenging and complex, was found to support the portfolio's functionality. As discussed in chapter 4, research prompted by the empirical findings of the need for scaffolding of the learning skills, raised awareness of the concepts of scaffolding by the teaching team, who responded by including scaffolded introduction and support, eventually including other tasks throughout the program. The ideas of induction above may be thought of as a form of scaffolding, that is, introducing a fairly complex assessment task and its elements over time and as it becomes appropriate to test and support students at increasingly challenging points.

The participants valued the portfolio for the fact it enabled them to demonstrate successes, achievements and growing evidence of an increasing range of sonographic skills. It was used by one participant as leverage to argue for increased learning time in her department, and was valued by staff for rapid appreciation of the level of the student and the exposure they were getting to different facets of workplace training. As the course progressed, participants reported it became a vehicle for valuable consolidation of experiences; summarising pathologies, creating tables of differential diagnoses and creating other aide memoirs. When developed, participants felt confident to use the portfolio to teach others. The research suggests that activities allowing students to exhibit these portfolio

achievements more widely amongst their teachers and peers could be valuable for generating discussions of quality, for giving and receiving feedback, and for encouraging students to manage their own feedback.

To summarise then, in the light of the research question asked of the ways in which portfolio assessment can be used in higher education to foster longer-term learning in early professional practice, we can conclude the following. Portfolios foster continuous engagement, which can result in an important evidential base of achievements that provide students with material for reflective practice, for developing independent learning practices and for engaging them in criteria and standards. Careful induction, scaffolded support and clear goals are needed. There was also some evidence that portfolios may allow graduates greater confidence in their early workplace learning, although the evidence for this was restricted, given the limited number of graduate participants interviewed, and further research should be done in this area.

Workplace Practices

In chapter 7, the research into workplace practices was reasonably extensive, thus a brief consideration will be given here. The findings identified that many continuing learning practices in new graduates were developed from within their context in the sonography profession. While workplace professional practices that facilitate ongoing learning are, of necessity, dependent on the context, there may be prompts worth considering by other closely related health professions and perhaps beyond. The Worksheet practice, for example, may have parallels in other health professions. The Interesting Case is likely to have similar counterparts in many aspects of medicine and health, while the Staff Meeting may be more broadly applicable.

The research into learning skills showed independent learning could be fostered in new graduates, and this was also prompted by the workplace practices of the interesting case and the film library, and in particular in the area of rarer pathology findings as the graduates encountered them through the practices. Implications of the findings of independent learning being fostered by workplace practices include reinforcement of the confidence to seek assistance from colleagues (usually more senior colleagues) and from the material resources available to them. The workplace practices identified also help with experiential learning. For example, discussions of how to annotate a worksheet when presented with a particular pathology, or the discussion of interesting cases, helped add to the bank of instances contributing to experience. This also translates to the findings that new graduates learnt about the wider area of medical imaging practice and the Australian healthcare context through the practice of staff meetings.

This concludes consideration of the research questions posed, for both students and new graduates. Due to the nature of educational design research, as discussed in chapter 3, other issues may arise that are not anticipated at the start. Therefore the final section of this chapter raises an important finding of the research not covered by the research questions. This will be discussed next.

Research Implications for Academic Development

This research project started with firm ideas about developing student capacity for learning in the longer term and was driven by a professional desire for improving student outcomes. One very significant aspect to emerge however, not initially considered, was the professional development of the researcher and the teaching team. All the sonography academic staff (including the researcher) most closely involved in the day-to-day mechanics of the program (as described in Chapter 3) were involved from the outset regarding the conceptual ideas, planning and execution, as described in

chapters 4 to 7. All are passionate about their profession and their teaching. All had undertaken the university's probationary requirement of a two-day seminar in teaching and learning, followed by various seminars and workshops on teaching and learning themes, and the researcher held a coursework master's degree in health science education, completed a decade previously. All were enthusiastic about the research and all tried to attend all meetings but this was not always possible, considering the usual heavy workloads and commitments of academic staff. Many corridor discussions were held to clarify points or raise issues that were later aired at formal meetings. No member of the team was averse to voicing a candid opinion or engaging in rigorous discussion. Usually, consensus or compromise was reached on the decisions implemented for and on the basis of the research.

For the academics 'on the ground' however, and in keeping with the usual course of the educational design research process, matters of a theoretical nature in teaching and learning became pertinent that had not been considered at the outset. Each iteration raised conceptual issues that either one or more of the teaching team had not previously encountered and which led to explanations and discussions. Often further research from the literature was brought back to meetings and new understandings arose. In the first iteration, these were ideas about continuous engagement and induction. In the second, considerations about what students were referring to when they talked about experience and confidence, also ideas around scaffolding. In the third iteration, what quality and competence meant to students, and ideas about practice that were new to both researcher and teaching team. Brief accounts are provided below for each.

In the first iteration, as the teaching team was immersed in debating the reasons the portfolio task had long been a successful element of the program, the ideas around student engagement began to surface. None of the teaching team, including the researcher, was aware of the body of literature around student engagement, or the existence of a national survey of

engagement. This was despite the fact that for the first (and only, at the time of writing) time the institution participated in a student engagement survey was in 2010, or even that it was a postgraduate survey (Coates, 2010). The research literature regarding student engagement was reviewed and presented by the researcher to get the team up to speed (see the student engagement section in chapter 4 for a brief summary). In particular, the six student engagement scales on the national survey were reviewed. These scales, believed to be measures of how students spend their time on learning, were reviewed against our local unit of study evaluation student surveys that had been conducted for each unit in the program over some years. The six survey measures are: 'Academic Challenge', the extent to which expectations and assessments challenge students to learn; 'Active Learning', a measure of students' efforts to actively construct knowledge, 'Student and Staff Interactions', exploring the level and nature of students' contact and interaction with teaching staff; 'Enriching Educational Experiences', looking at students' participation in broadening educational activities; 'Supportive Learning Environment', students' feelings of support within the university community; and 'Work Integrated Learning' which measures the integration of employment-focused work experiences into study (http://www.acer.edu.au/ausse/background). Some of the problems of the team's lack of awareness may be explained by the context of being a satellite campus, or the silo effect created by being in a faculty. In arguing for a holistic approach in universities to teaching and learning professional development for academic staff, Brew and Boud (1996), point out that many staff are focused on their faculty for opportunities to engage in teaching and learning rather than their institution
(p. 18). The findings of this research included raised awareness of the importance of staff development in the area of teaching and learning. An interesting aside to the findings that portfolio research raised awareness of staff development, is that these authors advocate a portfolio approach as a holistic way to evidence it (Brew and Boud, 1996, p. 23).

Reflecting on the readings, the team came to the conclusion that much of the impetus in the literature on student engagement was due to the desire to decrease attrition rates in programs. Perhaps then, another reason for our ignorance could be explained by the fact we had almost no attrition in the program. What we resolved to do was to find ways to keep abreast of the literature. Considerations were given to a number of ways we could do this. The first thought was to attend more seminars, but that was quickly rejected as we had already been down that path with obvious limited success. Consideration was given to forming a journal club to seek articles and discussions on teaching and learning, as some close colleagues had had success with this format (Milenkovic et al., 2008). In the end however we decided that that would be moving away from what we had found so productive. When we reflected on the process that had bought us to the discussion we were having, we attributed our increased learning mostly to just being involved in the project. We were learning from doing, as Knight et al.'s work (2006) showed, that academics in higher education report they learn about teaching in higher education through 'on-the-job learning' (p. 323). We also recognised the extra involvement as a group that the research had prompted and realised we were involved in a social setting, 'practicing' teaching and learning in our discussions, and that the practice had moved us forward as a group. Our engagement with practice theories in the investigation of continuing learning practices of the graduate participants had been particularly enlightening, and this was reinforced as we began to look at the literature on academic development and found our experience echoed in various theoretical considerations.

Two papers in particular resonated with the teaching team's emerging thoughts on academic development. In the first, one of the arguments put forward is that it must be reconceptualised to locate it more in the context of academic work. The author's point resonated with what we had discovered:

> Most academic development takes place in locations where
> academics spend most of their time: departments, professional

settings and research sites. It takes the form of exchanges with colleagues, interacting with students, working on problems, writing and associated activities. It is informal and not normally viewed as development. Nonetheless, it often has a more profound influence on staff than activities explicitly labeled as such (Boud, 1999b, p. 3).

The important work of centrally delivered programs, particularly for new academics was acknowledged, but the challenge of transferring this to department level work settings to continue the good work was raised. Peer learning and writing groups were examples of strategies suggested.

In a second paper that resonated with the research findings, Boud and Brew (2013) question some of the activities undertaken in academic staff development efforts as 'insufficiently grounded in the social practices of academic work and those who undertake it' (p. 209). They propose that development of the teaching and learning aspects of staff in their disciplinary or departmental contexts be viewed as a form of professional practice. From this perspective, development instead happens in 'grounded sites of practice' (p. 211) in response to the imperatives of everyday learning needs. This was implied from the research findings, in chapter 7. Additionally, these authors take up a Schatzkian view of learning through the 'practice turn' discussed in chapter 3, in the decade or so between the two articles. This highlights the significance of practice theories on contemporary notions of learning and dovetails the work of this thesis in looking at longer-term learning from a practice theory perspective.

As a group then, we determined to take on Boud's (1999b) caution that 'Local development activities are often limited by a tendency to parochialism, a lack of awareness of research on higher education and the reinforcement of bad habits which occurs when existing cultural practices are taking (sic) for granted' (p. 5). We resolved to continue to practice improving our

teaching and learning by continuing to meet as a group on this and other focused research topics that enhanced the teaching and learning activities for our students, and extended our own learning, but that we would investigate and argue for central support from those with expertise. Knight et al. (2006) contend, this means getting academic leaders to engage, where they do not already do so, with their responsibilities for the development of their colleagues as professional teachers' (p 336). Additionally, the team envisaged flow on effects of this development to their wider community. The success, for example, of the presentation on giving feedback and encouraging student responsibility for it at the clinical supervisors' meeting where it was raised in response to feedback on the consistency of assessors in chapter 5, encouraged us to add a teaching and learning topic of relevance to each meeting. A significant implication of this thesis therefore, was in the academic development of the staff and associated practitioners.

Conclusion

This chapter has considered the research findings in relation to the questions posed at the outset, regarding the use of portfolios in fostering longer-term learning both while students were engaged in their course and further, as they were new graduates. An additional finding was included, consistent with the educational design research method employed, of academic development. The next chapter will conclude the thesis.

Chapter 9 Conclusion

Introduction

This final chapter concludes the work of this thesis with an overview of the research findings, a discussion of the study limitations, a reflection on the body of work and claims of contribution to knowledge.

Review of the Thesis

The impetus for this thesis began with concerns faced by the researcher, teaching in a professional preparation higher education course, with professional changes that impacted on the preparedness of students to enter qualified practice. These changes, brought about by developments in the profession towards accreditation requirements, typical of current activity in the health professions in Australia, left the researcher and fellow responsible academics searching for ways to use the students' time in the course to encourage continuing learning beyond it. For the particular course that has been the vehicle for the research in this thesis, the issue was how to equip students to continue to learn those things they would need once they stepped into their first year as qualified workers. From this dilemma, emerged more general ideas of how to foster longer-term learning in the critical transition from student to qualified practitioner.

Considerations of how to embed longer-term learning changes into the course under investigation led to a review of the work by Mentkowski and Associates (2000) at Alverno College in the US, as one of the few examples of sustained success in this area. From this work, a number of learning skills were synthesised. Further work identified the assessment program in the course as a logical place to foster these learning skills, given the evidence that assessment has a strong influence on student learning behaviours. Additionally, assessment regimes at universities have

undergone many changes in recent times, providing a base of evidence from which to draw insight for the research design. Chapter 2 argued that of all assessment types, portfolios may offer advantages as the vehicle for interventions around learning skills to foster longer term learning, and found they have the potential to facilitate complex learning while students are at university, as well as longer term learning. Few studies have investigated the effect of portfolios on the continued learning of new graduates as they enter the first important years of professional practice. Portfolio assessment is very diverse, and has itself been subject to various influences over time, currently tending to be influenced by the standards agenda towards delivering a display of achievements at the expense of learning; it was argued they must do both.

To ask the sorts of questions needed to explore longer-term learning in the complex social milieu of a university course, preparing students for qualified practice in a mix of public and private health facilities, careful consideration was required. At the outset a view of learning as a socio-material activity was established, in contrast to traditional ideas that learning is knowledge passed from teacher to student. In the socio-material view, knowledge and skills are built through social, cultural and embodied practices. Thus both the learning taking place in the course while the participants were students, and that taking place in the workplace once the participants were graduates, was examined as a social activity. The research questions therefore concentrated on participants' experiences with the various elements of the interventions and with continuing learning in their workplace.

The research schedule developed from the questions, started with an existing portfolio assessment task which underwent an initial evaluation by the research participants (see chapter 4). This first iteration retained what worked well and improved what did not. In the second and third iterations, described in chapters 5 and 6, the portfolio was then redesigned with the addition of tasks aimed at fostering learning skills. Five learning skills were

added, to encourage the development of independent learning, of examining judgements made in practice, of implementing reflective practice, to encourage self-assessment and to gain practice in demonstrating competence by engaging with standards.

The educational design research approach, and the iterative nature of this research it supported, proved to be useful for this study in two major ways. The first was that it allowed consideration of emerging theoretical understandings that arose from the interventions and from the reported experiences of the participants. For example, the idea of scaffolding arose during the project in the second iteration (see chapter 5) and this allowed the necessary research into its nature, then dissemination of these findings to the teaching team, which in turn fed back into the subsequent redesign. The idea of scaffolding then permeated throughout the changes suggested by the research (see the Redesign Summary section of Chapter 6). The second way it proved fruitful was for suggesting future iterations based on the findings of the graduate research, that might feed back into further portfolio redesign elements as a future project.

As the participants were followed into their first qualified year, they were immersed in learning despite the lack of the support structures in place during their university course. The research found that at least two types of learning were important at this stage; one was contextual learning, that is, they were learning new applications of their field that were available in their context. For example, if expertise was available in knee ultrasound, students undertook to avail themselves of the learning required to master it. The second type of learning occurred through sonographic workplace practices, and this thesis represents the first efforts to outline practices that may foster learning in this professional field.

From this brief overview, the limitations of the study are considered next.

Limitations

The limitations of this study include the context dependent nature inherent in using a single higher education program for an investigation of longer-term learning, and within that, only those students who volunteered their time to participate in the research. The introduction of changes into the portfolio assessment alone, rather than into the curricular structures more generally might be considered a rather limited approach, however, it allowed some particularly interesting facets of the study to be studied, for example, that of the role of portfolios in fostering learning skills during and beyond a course, and the consideration of learning through workplace practices which might feed back into teaching.

At the conclusion of the research, it became apparent that the contribution of the student voice, through multiple focus groups and interviews, was stronger than that of the graduate voice, given the small number of graduate interviews. This could be considered a limitation of the study, given the aim was to investigate longer-term learning.

The investigation into workplace practices in a single field undertaken in chapter 7 was limited in scope and is exploratory by its nature. Further investigation into the workplace practices of sonographers would be required to make it robust. Kemmis (2006) explains the complexity of research into practice due to researchers' different perspectives of what makes a practice. He argues for the use of a reflective-dialectical approach that they say is of special interest to those who want to change practices by their efforts in participatory, collaborative research. This approach implies a larger scale of project involving the profession more broadly, which could not be achieved within the time frame of the research.

The iterative nature of this research necessarily implies further work is needed. The 2012 cohort were the first to benefit from the sum of the

changes reported in chapter 6, Table 6; however future directions include investigating the results of the changes which are beyond the scope of this research, thus this could be considered a limitation.

This study has been able to report results in the context of the participants, their course, and other students in the course, their teachers and the wider staff as outlined, with confidence. However, it is not possible to speak to the wider use of portfolios in professional education directly, although the findings may allow others to seek resonances and commonalities.

Reflexivity Revisited

In chapter 3, I began to address the reflexivity that is required in an interpretive research approach such as I have undertaken in this thesis, which involves the complex social environments of a university and workplaces, participants, students and teachers, and the embodied and material world it includes.

My interest in portfolios has been intensified by this research. Initially interested as they allowed me to gain deep insights into my students' professional engagement, reviewing and analyzing them for the research has given me a deeper appreciation of their workings and value as an assessment tool. It has also raised many further questions, such as their use in 'formal' continuing professional education, given the lack of concern participants of all levels showed for these requirements.

My initial feeling that a few crucial additions could enhance the effect of the portfolio and better align it with the goal of learning for the longer-term was challenged. The additions of the learning skills, perhaps with the exception of the independent learning skill which the participants appeared to take on board easily, were a struggle, and I felt at times I had a big jigsaw and was not quite sure where to put the pieces. It made the research challenging, as

I was hoping it would be successful. I now understand that successful research has little to do with successful pedagogy. That is, even though some aspects of the portfolio changes and the interventions were unsuccessful pedagogically, the research led to insights and better designs, so the research was successful. Initially I felt great disappointment when some of the pedagogical design interventions were unsuccessful, perhaps because I felt responsible, as a teacher with a master's degree in health education, to get it right the first time. The requirement to report the 'failures' for the research felt quite uncomfortable. As the iterations progressed however, and as the designs matured, I began to see how important the research was for getting the design working well.

In my future educational research, the two must be clearly separated in my mind. I anticipate having to continue to gain experience in educational research to become more effective at it.

I am excited about the workplace practices research, as I believe the findings might be fruitfully taken forward in future research that will benefit the professions' understanding of continuing learning. It can also be fed back into curriculum design to make clinical experience more valuable.

I felt the inclusion of the academic development section to be necessary despite misgivings that the research had not set about it from the start. Having engaged with the theories of workplace practices from the participants' perspective, I was struck by the notion that the teaching team and I were actually undertaking the same process in parallel, by learning from our engagement in our workplace practice. I conclude by acknowledging my feelings of deep gratitude to all those who made this research possible.

Claims of Contribution to Knowledge

This section identifies the contributions of this thesis to understandings of portfolio assessment for longer-term learning, the contribution of learning skills both within portfolios and for students' learning, and continuing learning practices of sonographers in their workplaces.

This research has identified that portfolios can be effective in fostering continuous engagement in learning in higher education, and supports other work into portfolios and how they might be used. It also draws attention to particular aspects and features that need to be paid close attention to, such as induction and support for the task, and the nuanced consideration as to where and how they are introduced in a program. Participants' comments demonstrated the portfolio had been useful both during the course and following it. As this thesis employed educational design research in a necessarily context-dependent assessment, the primary beneficiaries were always going to be the participants. Nonetheless, design is a central feature of much portfolio research, and the redesign elements conducted for this research had a particular purpose. They aimed to apply pedagogical practices that showed promise for equipping students for longer-term learning and provided evidence that this was achievable. In the introduction to this thesis, a quotation was used from Boud & Falchikov (2006) who contend assessment must build a foundation for lifelong learning. They went on to say that it is 'a formidable challenge' (p. 399). Aspects of this challenge have been taken up by this thesis, and it thus contributes to the field of portfolio assessment.

A further contribution of this research is the investigation of learning skills within the portfolio. Initially drawn from Mentkowski and Associates' (2000) work focusing on longer-term learning, and subsequently investigated through their various bodies of literature, these proved worthwhile inclusions in a portfolio to engage students in ideas about their own

learning. Again, the iterations of the research allowed investigation into the optimal points at which each was ultimately to be introduced into the program, relative to students' level.

Two primary research findings emerged from the iterative cycles investigating the participants' interactions with the portfolio during the course. One was the emergent design features that encouraged learning for the students, and the second were those pedagogical features useful for teachers in supporting portfolio work. Useful portfolio design features for student learning included continuous engagement which fostered time on task, building confidence through the requirement for independent research and reflection on practice, and gathering evidence of achievement over time. From a pedagogical perspective, the research findings identified desirable features to include careful and thorough induction to the task, scaffolding support with increasing challenges, and optimising portfolio structures for the development of feedback as a system managed by both teachers and students.

The research also identified things that didn't work and allowed them be removed, for example, asking students to think forward to their CPD requirements, which was unsuccessful and deleted from the portfolio. The finding that most advanced students and some new graduates were unconcerned about engaging with CPD, indicated perhaps that formal processes are not the impetus for learning that the professional bodies hope. This has implications for the significance of formal continuing professional education requirements for those professional bodies that require this of their members, as collecting 'evidence' of attendance at formal seminars and training sessions may not reflect learning, while participation in workplace practices may be a rich source of learning that goes unrecognised. Professional bodies looking for ways to help their members learn could consider this.

The research findings from the continuing learning of graduate participants in workplace practices, investigated in chapter 7, are of particular interest for their pedagogical implications. Ideas about learning through workplace practices are relatively unexplored generally, and no examples have been reported in the literature in sonography. Although practices are situated and embodied in context, and therefore the findings of the investigation into sonographic workplace practices are limited to the context, there are wider pedagogical implications for other professional areas. Dissemination of this research should open new understandings of its application in sonography, and perhaps in other professional courses.

This thesis also made a contribution to academic development, with its' unanticipated finding that involvement in the research project developed the teaching teams' understandings of learning and teaching issues that contributed directly to student learning. Once again, the direct benefit was within the context, though some filtered into the wider community around the course.

It is interesting to draw commonalities from the findings noted in these last three paragraphs; that the advanced students and graduates were motivated to learn by the opportunities presented by their workplace; that learning as seen through a 'practice theory' lens identified workplace practices of these graduates that facilitated significant ongoing learning; and that involvement in this research led to academic development of the teaching team through their workplace / academic practices. It might be considered that 'academic development' is a type of CPD for academics, at least in this study, as the teaching team was clearly shown to be engaging in learning through their academic practices and normal workplace doings. These three findings all emphasise a view of workplace practices as significant sites of learning. They could be interpreted as empirical evidence for Boud and Hager's (2012) argument: 'that continuing professional development might be better conceptualised within practice theory'.

Importantly, Boud and Hager (2012) conclude that in taking a practice theory view:

> 'The greater challenge for professional bodies, and indeed employers, is to find ways of acknowledging and accounting for CPD within this new conception. This is a matter with which they currently struggle as nothing can be simpler and easy to administer than recording courses completed or hours of attendance … While there is a move towards the keeping of portfolios and records of reflective practice by more sophisticated professional bodies, suspicion sometimes arises that these promote skills of self-portrayal rather than other forms of learning … The challenge of representing continuing learning to others remains even when there is greater clarity of what this learning is and how it can be promoted' (p. 28).

There are two notable implications for teaching practices arising from this thesis. The first is the pedagogical practice of portfolio assessment. This research has implied that an effective portfolio for longer-term learning requires continuous, scaffolded, supported engagement, across the curriculum, by both students and staff. In this instance, the requirement for weekly entries was found most useful for student engagement, generating confidence and fostering learning skills. Whether a less frequent requirement would be sufficient could be subject to further research, however it does raise implications for portfolio use in single units and/or more sporadic use. By extension, this research has implications for the use of portfolios in curriculum and assessment policy more widely, noting that their use requires sufficient resourcing for success. Further, the use of the iterative cycles to test the practicality of design implementations, demonstrated well that design and development of new portfolios must take this developmental, iterative approach.

The second implication for teaching practice is the use of 'the practice theories' to create new understandings of learning practices of new graduates in the workplace. Although in this study, the steps to employing these were exploratory, it nicely demonstrated some of its potential value. Once the workplace practices are elicited from a careful investigation of the workplace through a practice theory lens, they can be incorporated back into the portfolio, and indeed in the curriculum design more widely. While context dependent, a further implication is that this approach could be fruitfully employed in other professional and workplace settings, for example, the 'staff meeting' practice could potentially be more widely useful as a pedagogical strategy.

Conclusion

This thesis has found that portfolios are effective in fostering longer-term learning in health professional education. It has shown that portfolios are particularly effective in engaging participants during their course, useful in capturing moments of learning for later critique, and perceived by students as valuable in allowing the demonstration of achievements throughout. They require thorough induction processes and benefit from context-specific exemplars. Learning skills are a worthwhile inclusion into a context rich portfolio, however, they require careful positioning within a program relative to the level of the student, work best with scaffolded supports in place, and with increasingly challenging tasks.

The research undertaken into identifying workplace practices that foster continuing learning of graduates promises a unique and fruitful avenue for future research, particularly in this field, and has implications for teaching, for feeding practices back into portfolio tasks, and indeed for curriculum design.

Appendices

Appendix 1

Portfolio Assessment For Longer Term Learning In Health Professional Education

Interview Questions – Novice Level - for Focus Groups and Individual Interviews

As the purpose of the research is to carry out in-depth interviews with the participants, these questions are a guide only. Themes that emerge in the course of the interview will be explored.

These questions will be used with 'novice' participants, that it, students who are less than 12 months into their course. These participants will have completed up to 12 months of the Professional Practice Portfolio and are represented by the 'Novice' cohort in the Research Schedule, Appendix 5.

Preamble –

Thanks so much for agreeing to do this interview/focus group today, I really appreciate your time.

If you don't mind, I am going to record our interview with this audio recorder, like it said in the Participant Information Sheet. Would that be ok?

I just wanted to remind you that doing this is entirely voluntary, and make sure you know you can stop at any time and that will be completely ok, and I will erase the recording. Is that ok? (allow time for a considered response; monitor behaviours to ensure student seems at ease; record response). Note – for focus groups … 'you can stop at any time and leave and that's fine, the only thing is that the information you have provided to that point will be part of the transcript and cannot be erased, however you will not be identified in any way'.

So today we are going to discuss the professional practice portfolio and your experience with it, and I don't really want to know if it's good or bad, I just want to know about how you went about doing it and what you think about it, and maybe how the other things you do in your course interact with it. It might seem that I repeat some questions, but that's just to make sure I really understand, so if you don't mind, try to answer.

Questions –

When you first heard that you would be asked to do a portfolio for the course, did you have any reaction to that?
> *Discover any preconceptions – is this student familiar with such a task, or a reflective portfolio, etc, and if so, were they a positive or negative experience?*

When we first looked at how to do the portfolio in the tutorial about it at the start of the course, was it what you thought a portfolio would be, or was it something different?
> *What were they expecting, and was this task any different?*

Have you had any experience of writing anything like this before, say in your undergraduate degree or other courses?
> *If they have – how did you find that went for you? (what sort of experience was it for them, did they find it has had any ongoing effects on how they learn or have they continued to do anything like that since then?*

Tell me about what happened when you first started with the professional practice portfolio task.
> *for novice students, look for any unintended or unanticipated effects*

Can you tell me about how you went about writing up your portfolio entries the first few times? How did you go about collecting the information?
> *get them thinking back to the task*

How did you decide on a case to write up in your portfolio?
what factors influence the choices

So I want you to think about an example where you wrote up a pathology finding. What happened when you looked back at that patient's scan?
The intent here is to ask about their reflective practices without saying the word 'reflection' as we know from a previous evaluation that this brings up different connotations for different students, and often a negative feeling towards 'reflective journals' required in their undergraduate courses. We wish to see whether it arises. If the concept of reflection is raised and not negatively, this will then be followed up.

Where you are asked to assess the quality of your images, how did you go about doing that?
Explore the underlying perception of what 'assessing quality' entails for the student and explore broad themes of how they do it

Where you are asked to discuss any judgments made, how did you go about that?
What judgments are made in practice? How did you judge that you had done the right thing / diagnosed the right pathology / attributed the right mechanism to the artifact? Hoping to draw out information about judgments made and how they have reflected upon them. Follow on questions might include any learning that occurred and how they might change their practice in the future.

Where you are asked to discuss how you evaluate the quality of the portfolio entry, how do you do that? How do you decide that you have done the best you could in that write-up?
Draw out information about self-assessment and using others in looking at whether their work is of good quality

Where you are asked to discuss any resources you used to evaluate the quality of the portfolio entry, how did you do that?
Find out what resources they use – references, further tests, colleagues, mentors, etc

I would like you now to think back on any artifacts or physics entries or sonographic techniques you chose for your portfolio, and think about one (or any) that involved any decisions you made and tell me about that.
Explore any differences between the 'physics/technique' and 'pathology' approaches

Where you are asked to discuss your judgments and quality for a physics entry, how did you go about that?
Is there any difference between their self-assessment and using others when the subject of the entry is physics

Where you are asked to evaluate the quality of the portfolio entry, how did you go about that?
Is there any difference between physics and pathology in the resources they employ? Are different people involved?

When you are writing up each entry, do you think about what you might have done or should have done in that situation?
Try to find out more about judgments in practice

Do any of the other assessments in the course impact on your ability to complete the portfolio or do it as well as you would like?
What are the competing interests?

Does completing your portfolio have any effect on any of the other assessments in the course?
Do any of the skills they gain in completing the portfolio contribute to their other tasks?

Does completing your portfolio have any effect on what you do in clinical practice?

Does the portfolio contribute to professional practice? Are there any positive or negative associations?

Having done the portfolio now for a while, and thought about how it went for you, are there any strategies you might use next semester?
will there be any impacts on learning in the short term? Might they do anything differently now they have thought about it or when they hear what others are doing?

Are there any other comments you would like to make or anything you feel might add to our discusson?

Closing comments –
Thanks so much for agreeing to do this interview/focus group today, I really appreciate your time. I will be sending you the transcript soon so you can check my interpretation is what you intended to say. If you think of any other comments, please add these.

Portfolio Assessment For Longer Term Learning In Health Professional Education

Interview Questions – Intermediate and Advanced - for Focus Groups and Individual Interviews

As the purpose of the research is to carry out in-depth interviews with the participants, these questions are a guide only. Themes that emerge in the course of the interview will be explored.

These questions will be used with 'intermediate' participants, that it, students who are between 12 months and 2 years into their course. These participants will have completed 12 to 18 months of the Professional Practice Portfolio and are represented by the 'Intermediate' and 'Advanced' cohorts in the Research Schedule, Appendix 5.

Preamble –

> *Thanks so much for agreeing to do this interview/focus group today, I really appreciate your time, especially as this is not the first focus group/interview you have done for me!*
> *If you don't mind, I am going to record our interview with this audio recorder, as before. Would that be ok?*
>
> *I just wanted to remind you that doing this is entirely voluntary, and make sure you know you can stop at any time and that will be completely ok, and I will erase the recording. Is that ok? (allow time for a considered response; monitor behaviours to ensure student seems at ease; record response). Note – for focus groups … 'you can stop at any time and leave and that's fine, the only thing is that the information you have provided to that point will be part of the transcript and cannot be erased, however you will not be identified in any way'.*
>
> *So today we are going to talk again about the professional practice portfolio and your experience with it, and how you went about doing it and what you think about it, and maybe how your approach to it has changed over time. It might seem that I repeat some questions, but that's just to make sure I really understand, so if you don't mind, try to answer.*

Questions –

So tell me about how you are going with your professional practice portfolio, now that it has been assessed by colleagues and Uni supervisors, how is it working for you?
> *Are they doing anything differently now they have gained some experience with it?*

So I want you to think again about a recent example where you wrote up a pathology finding. What happened when you looked back at that patient's scan?
> *The intent here is to explore any differences between how they went about the task as novices and how they go about it now they have had experience*

Where you are asked to comment on the quality of your images for the portfolio, how did you go about doing that?
> *Explore the underlying perception of what 'assessing quality' entails now that they have more experience and confidence in the field.*

Where you have to write up any judgments made, how do you go about that now you have had more practice?
> *What judgments are made in practice? How did you judge that you had done the right thing / diagnosed the right pathology / attributed the right mechanism to the artifact? Are there any differences between novice and intermediate participants here?*

Where you are asked to discuss how you evaluate the quality of the portfolio entry, how do you do that now, and has it changed from last time we spoke?
> *Draw out information about self-assessment and using others in looking at whether their work is of good quality now they have experience*

Where you are asked to discuss any resources you used to evaluate the quality of the portfolio entry, how did you do that now? Has it changed from last time we spoke?

> *Find out what resources they use – references, further tests, colleagues, mentors, etc. Are there any changes and why?*

I would like you now to think about any artifacts or physics entries or sonographic techniques you have recently chosen for your portfolio, and think about one (or any) that involved any decisions you made and tell me about that.

> *Explore any differences between the 'physics/technique' and 'pathology' approaches*

Where you are asked to discuss your judgments and quality for a physics entry, how do you go about that now?

> *How do they judge the entry and its quality when the subject of the entry is physics. Has there been any change in the way this is done?*

Where you are asked to evaluate the quality of the portfolio entry, how do you do it now? Is that different from when you started out?

> *Is there any difference in the self-assessment strategies they employ now?*

When you are writing up each entry, do you think about what you might have done or should have done in that situation?

> *Try to find out more about judgments in practice.*

Do any of the other things in the course impact on your ability to complete the portfolio or do it as well as you would like?

> *What are the competing interests?*

Does completing your portfolio have any effect on any of the other assessments in the course?

> *Do any of the skills they gain in completing the portfolio contribute to their other tasks?*

Does completing your portfolio have any effect on what you do in clinical practice?

> *Does the portfolio contribute to professional practice? Are there any positive or negative associations?*

Having done the portfolio now for a while, and thought about how it went for you, are there any strategies you might use next semester?

> *will there be any impacts on learning in the short term? Might they do anything differently now they have thought about it or when they hear what others are doing?*

If you are nearly finished the course, having done the portfolio for 2 years, and thought about how it went for you, are there any strategies you have learnt from it that you might continue on when you are finished?

> *will there be any impacts on learning in the longer term? Might they do continue to collect portfolio entries / samples / libraries for continued learning or as part of their continuing professional education requirements?*

Are there any other comments you would like to make or anything you feel might add to our discussion?

Closing comments –

> *Thanks so much for agreeing to do this interview/focus group today, I really appreciate your time. I will be sending you the transcript soon so you can check my interpretation is what you intended to say. If you think of any other comments, please add these.*

Portfolio Assessment For Longer Term Learning In Health Professional Education

Interview Questions – Graduate Level - for Individual Interviews

As the purpose of the research is to carry out in-depth interviews with the participants, these questions are a guide only. Themes that emerge in the course of the interview will be explored.

These questions will be used with 'graduate' participants, that it, students who have successfully completed their course and are between 6 months and 1 years into their practice as a qualified professional. These participants are represented by the 'Graduate' cohort in the Research Schedule, Appendix 5.

Preamble –

> *Thanks so much for agreeing to do this interview/focus group today, I really appreciate your time, especially as you are no longer a student!*
>
> *If you don't mind, I am going to record our interview with this audio recorder, as before. Would that be ok?*
>
> *I just wanted to remind you that doing this is entirely voluntary, and make sure you know you can stop at any time and that will be completely ok, and I will erase the recording. Is that ok? (allow time for a considered response; monitor behaviours to ensure student seems at ease; record response). Note – for focus groups … 'you can stop at any time and leave and that's fine, the only thing is that the information you have provided to that point will be part of the transcript and cannot be erased, however you will not be identified in any way'.*
>
> *So today we are going to talk again about the professional practice portfolio and your experience with it, and how you went about doing it and what you think about it, and maybe how your approach to it has changed over time. It might seem that I repeat some questions, but that's just to make sure I really understand, so if you don't mind, try to answer.*

Questions –

So tell me how you are going now you are qualified and practicing? How do you find your work?
> *General information*

What has changed for you now that you are no longer a student, now that you have your qualification?
> *How are things different now that they are a qualified professional, have they taken on additional responsibilities? Extended their expertise in any areas? Had to do any teaching? Had any critical incidents?*

So can I get you to think back to your Uni days and your Professional Practice Portfolio, and remember that you completed it all through the 2 years of the course. Have you thought about it since?
> *Explore whether they might have used it to seek a new job or ??*

In each of those portfolio entries, you were asked to write up any judgments made. How do you assess the judgments you make now in clinical practice?
> *What judgments are made in practice? How do you judge that you have done the right thing / diagnosed the right pathology / attributed the right mechanism to the artifact? What do graduate participants think about judgements?*

In those portfolio entries, you were asked to write up how you assess the quality of an entry. How do you assess the quality of your clinical practice now that you are qualified?

Explore the underlying perception of what 'assessing quality' entails now that they have experience and confidence in the field.

Has the way you assess the quality of your work changed since last time we spoke?
Draw out information about self-assessment and using others in looking at whether their work is of good quality now they have experience

When you were doing the portfolio you were asked to discuss any resources you used to evaluate the quality of the portfolio entry, do you do that now? Has it changed from last time we spoke?
Find out what resources they use – references, further tests, colleagues, mentors, etc. Are there any changes and why?

Having done the portfolio for 2 years during the course, and thinking about how it went for you, are there any strategies you have learnt from it that have carried on into your qualified practice?
Were there any impacts on longer-term learning? Do they still do a portfolio? Do they still refer to resources collected in the portfolio during the course? Have they continued to collect portfolio entries / samples / libraries for continued learning or as part of their continuing professional education requirements?

Are there any other comments you would like to make or anything you feel might add to our discusson?

Closing comments –
Thanks so much for agreeing to do this interview/focus group today, I really appreciate your time. I will be sending you the transcript soon so you can check my interpretation is what you intended to say. If you think of any other comments, please add these.

Appendix 2

University of Technology Sydney Participant Recruitment Email

Recruitment Email

FACULTY OF ARTS & SOCIAL SCIENCES

UTS:EDUCATION

UNIVERSITY OF TECHNOLOGY SYDNEY

CAN YOU HELP?

We are looking for students to help our research into the

'Portfolios for Longer Term Learning' project.

We are undertaking a research project investigating you and your experience with your Professional Practice Portfolio. We want to examine its design for effectiveness as a learning tool and investigate ways it can work better for you, both while you are at Uni and also once you have finished your course. We will improve the design of the portfolio, based on your feedback, throughout the course, so the more volunteers we have the better! We would also like to see if it can help once you need to collect your Continuing Professional Education points.

To do this, we would like to ask you how you interact with this task, what your attitudes are to various design features and to measure your learning skills over time by asking you to attend a focus group or two, complete a short questionnaire, and possibly be interviewed.

Jill Clarke, who is a student of the University of Technology, Sydney, will be working on this study with you, and the more students who volunteer the better the study will be! It will take about an hour for each focus group which will be held in a lunch break during a block attendance. Refreshments will be provided and this research will not interfere with your study. Participating in the research is completely voluntary, all responses are strictly anonymous and you are under no obligation to agree to join the study.

If you can help, please contact Kathy Mossemenear on 9351 9257 or Kathleen.Mossemenear@sydney.edu.au who will send you more information.

Or if you want to find out more about the study, please contact Jill Clarke on 9351 9516 or Jillian.L.Clarke@student.uts.edu.au

Thanks!

Appendix 3

University of Technology Sydney Participant Information Letter

Information Letter

Portfolios for Longer Term Learning
INFORMATION LETTER

(1) What is the study about?
This study is about designing your Professional Practice Portfolio to best help you learn, both during and after your course. We want to make this important part of your clinical learning as useful as possible by building in features that help you develop learning skills and confidence in your clinical judgements. To do this we need to ask you, anonymously, how and what you think we can improve.

(2) Who is carrying out the study?
The study is being conducted by Jill Clarke, a student at UTS, and will contribute to her degree of Doctor of Philosophy under the supervision of Professor David Boud at UTS.

(3) What does the study involve?
If you say yes, we will ask you to attend one lunchtime session during your on-campus blocks. During this session we will ask you to join a focus group and fill in an anonymous questionnaire. Lunch will be provided and the session will not interfere with your lectures. We may also request an interview at a later date. If you say no, nothing will happen. I will thank you for your time so far and won't contact you about this research again.

(4) How much time will the study take?
Approximately one hour for the lunchtime sessions and about 30 minutes for an interview. We may ask you to read the interview transcript to check our understanding of your opinions is correct, which can take 20 minutes.

(5) Can I withdraw from the study?
Being in this study is completely voluntary. You can change your mind at any time and you don't have to say why. I will thank you for your time so far and won't contact you about this research again.

(6) Will anyone else know the results?
All aspects of the study, including results, will be strictly confidential and only the researchers will have access to information on participants. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

(7) Are there any risks?
There are very few if any risks because the research has been carefully designed. However, it is possible that you may experience some anxiety discussing assessment, in which case you may choose to withdraw.

(8) Will the study benefit me?
Your feedback in this study will help us determine the best design for the Professional Practice Portfolio, which will be updated during the course. The feedback from your information will be incorporated into the Portfolio design. We hope the new design will be of benefit.

(9) What if I require further information?
When you have read this information, Jill Clarke will discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact her on 9351 9516 or Jillian.L.Clarke@student.uts.edu.au, or David Boud at UTS on 9514 3945 or David.Boud@uts.edu.au.

(10) What if I have a complaint or concerns?
If you would like to talk to someone who is not connected with the research, you may contact the Research Ethics Officer on 02 9514 9772, and quote this number (UTS HREC REF NO. 2010-136A)

This information sheet is for you to keep

Appendix 4

University of Technology Sydney Participant Consent Form

Consent Form

UNIVERSITY OF TECHNOLOGY, SYDNEY
Consent Form

I _____ *(participant's name)* agree to participate in the research project Portfolios for Longer Term Learning (UTS HREC REF NO. 2010-136A) being conducted by Jill Clarke, (c/- University of Sydney, Medical Radiation Sciences, 9351 9516), of the University of Technology, Sydney for her degree of Doctor of Philosophy (PhD).

I understand that the purpose of this study is to investigate the Professional Practice Portfolio and it's effect on learning skills during the course and in the longer term.

I understand that my participation in this research will involve attending focus groups and completing questionnaires during a lunch break in a block session, and the possibility of being interviewed (at a time convenient to myself). I understand that focus groups and interviews will be recorded using a digital audio recording device.

I am aware that I can contact Jill Clarke or her supervisor David Boud (Ph: 02 9514 3945 or email David.Boud@uts.edu.au) if I have any concerns about the research. I also understand that I am free to withdraw my participation from this research project at any time I wish, without consequences, and without giving a reason. I understand that withdrawal from the project will not have any effect on my relationship with the researcher or the University.

I agree that Jill Clarke has answered any questions I had fully and clearly.

I agree that the research data gathered from this project may be published in a form that does not identify me in any way.

_____   ____/____/____
Signature (participant)

_____   ____/____/____
Signature (researcher or delegate)

NOTE:
This study has been approved by the University of Technology, Sydney Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research which you cannot resolve with the researcher, you may contact the Ethics Committee through the Research Ethics Officer (ph: +61 2 9514 9772 Research.Ethics@uts.edu.au) and quote the UTS HREC reference number 2010-136A. Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

Appendix 5

University of Technology Sydney Ethics Clearance Letter

26 May 2010

Professor David Boud
Communication & Learning Group
CB10.05
UNIVERSITY OF TECHNOLOGY, SYDNEY

Dear David,

UTS HREC 2010-136 – BOUD, Professor David (for CLARKE, Ms Jillian, PhD student) – "Portfolio Assessment For Longer Term Learning In Health Professional Education"

Thank you for your response to my email dated 19/05/10. Your response satisfactorily addresses the concerns and questions raised by the Committee, and I am pleased to inform you that ethics clearance is now granted.

Your clearance number is UTS HREC REF NO. 2010-136A

Please note that the ethical conduct of research is an on-going process. The *National Statement on Ethical Conduct in Research Involving Humans* requires us to obtain a report about the progress of the research, and in particular about any changes to the research which may have ethical implications. This report form must be completed at least annually, and at the end of the project (if it takes more than a year). The Ethics Secretariat will contact you when it is time to complete your first report.

I also refer you to the AVCC guidelines relating to the storage of data, which require that data be kept for a minimum of 5 years after publication of research. However, in NSW, longer retention requirements are required for research on human subjects with potential long-term effects, research with long-term environmental effects, or research considered of national or international significance, importance, or controversy. If the data from this research project falls into one of these categories, contact University Records for advice on long-term retention.

If you have any queries about your ethics clearance, or require any amendments to your research in the future, please do not hesitate to contact the Ethics Secretariat at the Research and Innovation Office, on 02 9514 9772.

Yours sincerely,

Professor Jane Stein-Parbury
Chairperson
UTS Human Research Ethics Committee

Appendix 6
Portfolio Marking Rubric

PORTFOLIO ASSESSMENT

Student:	
	Assessment 1 ☐ Assessment 2 ☐
Clinical Practice in: Superficial Str ☐ Abdominal ☐ Independent ☐ O&G ☐ Other ☐ _ _ _ _ _ _ _ _ _ _	

Portfolio Contains	Poor	Marginal	Acceptable	Out-standing
Record of daily ultrasound scans				
Evidence of 3 days per week spent performing ultrasound examinations				
Evidence of adequate examinations performed in subject area (eg abdominal)				
Evidence examinations cover range of pathologies and patient presentation (eg comment section of day sheet)				
Equivalent of one example per week from commencement of scanning				
Student demonstrates learning from research for each entry				
Student demonstrates ability to apply relevant research				
Image(s) show a range of clinical learning achieved				
Portfolio presentation is at postgraduate level				
Progress reflects advancement in complexity of clinical skills **(not applicable first assessment)**				

Assessment Criteria:

POOR = performance is totally unacceptable   ACCEPTABLE = acceptable performance
MARGINAL = duties performed below required level   OUTSTANDING = excellent performance

Supervisor's comments:
Supervisor's Signature: Date:

Student's comments:
Student's Signature: Date:

WHITE: Return to University in reply paid envelope   **YELLOW: Supervisor's copy**   **PINK: Student's copy**

Appendix 7

Modified Portfolio Guidelines

You should aim to compile a portfolio which demonstrates your learning in your clinical practice over the duration of the Semester.

Each week, choose an examination in which you discovered something new, learnt something significant or gained a new perspective on something you had known before. From this examination, collect an image (or up to four images) that demonstrates it well. It may be as simple as an organ that you have had difficulty visualising that you see clearly on this occasion. Or it may be a pathology you have not encountered before, which you may have recognised as 'not normal' or a senior sonographer may have pointed out. What you choose is completely up to you, but start with things you are scanning the most.

Investigate this organ/pathology (or other finding) using any resources at your disposal. Typical resources you might use would include:

A good ultrasound textbook is an excellent start. Examples include Rumack for general ultrasound or Callen for obstetrics. Most departments will have these texts in the radiology department or the University Library has copies and is open on weekends, and/or

a PubMed search for relevant articles. Many departments will have access to PubMed but you may have to start work early or stay late to access it. Again, the University Library with its multitude of excellent resources is open late and on weekends, and/or

your distance learning materials have numerous articles in the reading section that may be useful and/or

other reputable resources and/or

a knowledgable colleague (but *not only* a colleague!).

Write two or three paragraphs explaining the significance of what you have chosen, what you learnt (that is, what you now know from having done your research), and how it might influence what you do in the future (this could be generally, or in this specific pathology). As you will draw from books/journal articles to justify how your image(s) represent a good example / an unusual finding / a particular pathology with these typical appearances, these must be referenced as per the Guide to Presentation of Assignments.

At the end of the semester, having written up one portfolio entry per week, you will submit a collection of images that demonstrate you have understood and reflected upon a good range of clinical learning opportunities, using credible references to inform your work. At each clinical assessment, your portfolio will be discussed with you by your supervisor and assessed.

AND

b) In the back of your portfolio, you should keep a log of all ultrasound patients scanned by you during the Semester. Entries can be completed after each patient is scanned or at the end of the day. This should take no more than 5 minutes of your day; many departments already use

'day sheets' to record patients. It is imperative that patient names or identifiers should not be included. The log should demonstrate that you have been performing the required clinical hours per week, a range of different studies, and a reasonable number of cases in the clinical area being studied. Your supervisor can discuss with you what is reasonable in your situation. An example of a day sheet which you may photocopy is provided: see Appendix.

NOTE: In the future, this portfolio may be useful as an example of your skills, for example in a change of employment or promotion, etc. Use an A4 folder (or A4 Word document) to store your images and relevant information. Films need to be presented for easy viewing. Images may be in the form of film, colour or polaroid print or *one* video tape, but the grey scale must approximate film quality. Images must be your own work and can be from no earlier than the date of your enrolment in the course. Supervisors will assess the portfolio at each clinical visit. Images: The images included in the portfolio should demonstrate a particular aspect of sonography that demonstrate your clinical learning. Be prepared to explain to your supervisor why you have included each image and its significance for you. Unlike the Case Studies, these images do not have to be specific to the subject area being studied, nor do they neccessarily have to show pathology. Rather, your portfolio should demonstrate a wide appreciation of the integration of all your units of study to the practice of sonography in the chosen area. Images should be 'snapshots' rather than whole studies, cut or crop the selected images to fit on an A4 sheet. If one image tells the story, that is all that is required but up to 4 images on one film is acceptable. Here are some examples of the things that may be included, but it is by no means an exhaustive list:

Image	Outline of a Typical Comment:
Normal anatomy	This is the best example I have seen of a (particular organ of structure). Rumack et al (year) describe this organ as typically (echogenic / echolucent / homogenous / etc) and measuring up to X x Y x Z cm. It's features are .... In this example I encountered in my clinical practice, this is a typical appearance. It is seen well because (the patient has fasted / has an optimally full bladder / etc.). I found this interesting because ...
Variations of normal anatomy	This structure is usually...but in this patient it is..
Identification of Pathology	A 'snapshot' of a pathology which you have not personally encountered before. You will use a good reference to describe the pathology and outline the imaging features typical in this disease, and how your case is similar / different to this.
Sonographic technique	The improvement I obtained by employing the technique of .....

Appendix 8

Analysis of Sonographic Practices

This Appendix outlines the analysis of each of the four sonographic practices identified in chapter 7. The first one, 'The Sonographers Worksheet', appears in chapter 7 in its entirety and is included here for completeness. The remaining three practices appear here in their entirety but are summarised in chapter 7.

Practice: *Sonographers Worksheet Practice*
Sayings and Doings: The most common sayings are discussions between the radiologist and the sonographer during or following the examination, but a worksheet may also be discussed with other sonographers, for example, a senior might help a junior with advice on its completion, or it may be discussed with a new employee at induction to show them the normal routine. It might be raised in discussions to draw attention to an improvement that might be made or new research that should be incorporated into the examination. It is updated periodically as new protocols and policies come to light. The doings surrounding the Worksheet include writing or drawing on the pro-forma, performing the examination according to rules, protocols and norms, scanning it into a computer system and all the accompanying activities that make sense around it.
Embodied: Completing the worksheet usually involves interaction with the patient beyond just using the ultrasound equipment to scan, including information from discourse about their symptoms and their clinical history, information from embodied contact such as palpating a lump or making a visual or clinical examination of the area of interest, and these all operate within particular social and cultural contexts. A sense of agency or ownership or professional identity might be conveyed in the assertions of having 'found' pathology, or arguing that something on the film is an artefact rather than 'real' due to the physics of ultrasound, or advocating for a patient in certain circumstances.
Materially mediated: The Worksheet is embedded in the use of the ultrasound machine and it's associated equipment, the scanning room, examination bed, scanning gel, film-producing equipment, administration and reporting systems, as well as the actors with which they are ensconced: sonographers, patients, radiologists, receptionists, ultrasound service engineers, referring doctors, typists, transcriptionists and others. The recording of measurements, indices and comments on anomaly/abnormality occur within a background of routine 'normal' measurements, protocols and policies such as Medicare rebates. These material things influence the practice, for example, a new transducer design or a new functionality of a machine may enable new or different measurements or observations to be made, resulting in a change to the Worksheet that reflects this. The materiality can and does change this practice.

Relational:
Worksheet practices are relational in that each instance will be different depending on what the individual sonographer brings to the episode of writing up the worksheet, their experiences and history in relation to this episode. Worksheets may be completed differently for different radiologists and for different subsets of pathological conditions.

Situated:
Creating a worksheet for each examination is a situated practice in that it reflects the individual culture of a particular department. The time and care taken to complete the worksheet for example, depends on whether the report will serve as preliminary findings to go in a patient's hospital/surgical notes, or whether a 'normal' exam has become so routinized that all that is required is a couple of computer keystrokes. Worksheets can reflect differences in departmental specialisms, e.g. the worksheet for a Carotid ultrasound study can look very different in a radiology practice compared to a vascular surgery practice. Regardless of this, the worksheet supports the radiologists' reporting practices or the surgeons' surgical practices and their interaction with sonographers.

Emergent:
Worksheets are an emergent practice in that 'they have a history within … [the] profession but they change over time, with contexts, and in the light of circumstances' (Rooney p275). Worksheets may change when departments merge and two versions of a worksheet are revised to suit the new combined workforce, understandings are shared and the practice is revised to suit. New staff may bring different views or new skill sets to a department, creating the need for revision of a worksheet or even creation of a new one (e.g. a new biopsy procedure or Doppler examination).

Practice: The Interesting Case
Description: In most instances, the purpose of an ultrasound examination is to detect and diagnose pathology. Having said that, many types of scans are repeated many times and are routine and normal. The 'Interesting Case' is one that demonstrates an unusual or rare pathology, but could also be an outstanding or unusual finding of a normal anatomy or anomaly or involve an interesting social occurrence. In everyday practice, these might crop up once or twice a week, and generate interest from all staff in the department who might gather around a light box or monitor to look (and learn). The discussion of an Interesting Case has a long history in medicine, and it has parallels with medical 'grand rounds' or case meetings. Case studies are a familiar feature of continuing learning events, conferences and health journals, where they will have been elaborated and researched, but the practice here is the Interesting Case that pops up in daily work.
Sayings: The Interesting Case is announced reasonably quietly around the working area. The 'sayings' are things like: 'hey, come and look at this', or 'what do you think of this'? Professionals from different groups are drawn to the display of images - other sonographers usually, but also students, radiographers, radiologists, nurses, etc. As radiology workplaces are typically open and patients move through or past them regularly, it is mostly a reasonably quiet announcement to ensure privacy if it happens during the day. It usually involves a discussion between at least two professional groups but often more, e.g. sonographers, mammographers and radiologists discussing an interesting breast finding, sonographers, CT radiographers and a radiologist interacting over images deciding where best to take a biopsy of a lesion, or may even not be images, for example, sonographers and patients and nurses might discuss the patient's wound. Sometimes it occurs at the end of the day when staff come together for 'reporting sessions', and the interesting studies come up for discussion as the radiologist (or other specialist) dictates the formal report for the patient.
Doings: The doings surrounding the Interesting Case as it happens in everyday practice include movement, which could involve creating a space to display images, e.g. gathering the X-ray films from the processor to display on a light box or making a space or organising chairs around a monitor so all can see. It mostly involves pointing and indicating specific areas or features of the images, and often more than one person will indicate different things of interest that support or provide an alternate diagnosis. The doings in this practice may have a number of purposes such as seeking expertise, professional input, teaching or raising awareness. In more formal settings it might include gathering textbooks or seating or coffee. Conference doings would be an extreme example of the formal presentation of the case, but it's the everyday interesting case that is of concern here.

Embodied:
The Interesting Case is a familiar entity to sonography (and most medical and allied health professionals). It encapsulates what sonographers recognise as routine from their day-to-day practice and from their higher education experience where they have been involved in interpreting multitudes of interesting cases classified into particular body areas or other subsets. Those involved bring their bodies, backgrounds, professional perspectives and previous experience to bear. The professional identities of the health professionals involved are reaffirmed and enhanced. Each instance of the practice and its outcomes are shaped by the people involved, for example, a radiologist might feel strongly that in this case, the patient should go on to have further testing or a sonographer might point out that the patient may not tolerate it given something they have learned from their clinical history.

Materially mediated:
The Interesting Case, as a practice, hinges on the material aspects of performing ultrasound examinations and all the paraphernalia associated with a diagnostic imaging department and it's staff. It involves discourses between sonographers, radiographers, patients, radiologists, referring doctors and others, who may bring their bodies physically or electronically, and bodily contact through the ultrasound examination. The display and discussion of the interesting case includes the images which may be hard copy film displayed on a light box or images on a monitor, usually a high definition display or as part of the department's PACS (Picture Archiving Computer System). The discussion might include missing materialities such as images that should have been taken as part of the case or patient information that should/could have been gathered. The material things influence this practice, for example a discussion around a particular pathology might result in the next instance of the practice recalling that, or it might result in a change to the images that are taken to reflect that pathology. Casual instances of the practice, such as a quick discussion in the work area with a few people, might lead to a more formal presentation in a monthly meeting or conference or paper, but of interest here is the daily workplace instances. Other materialities impact on the presentation of the interesting case, such as the Worksheet (mentioned above), the procedures, protocols and policies at play.

Relational:
The opportunity to engage in the practice of presenting the Interesting Case is dependent upon the relations at play, for example the presence of a student might persuade a sonographer to initiate an instance. As the practice is 'embedded in sets of dynamic social interactions, connections and relationships' (Rooney et al., 2010, p. 274), it might be undertaken or not depending on the interests or expertise of the senior staff or the radiologist, or the expertise of a particular sonographer. Staff may be encouraged or discouraged from initiating the practice depending on whether their experiences in previous encounters were positive or negative in the past, for example, if they had experienced positive emotions about being the person to detect the interesting finding or negative emotions because they had missed a secondary feature it would infer.

Situated: The practice of the interesting case is a situated practice, in that 'like any other social process (it is) situated in specific contexts of power/knowledge … depending on unstated assumptions and shared knowledge for the mutual achievement of sense' (Gherardi, 2008, p. 517). Thus initiating this practice might be situated in surrounding conditions such as the assumptions surround this particular instance, whether there are time pressures that prevent it happening or make it happen informally or formally. The interest of others might or might not be piqued dependent upon the prevailing culture of that particular site. For example, in busy private practices where time is at a premium workers may be less likely to undertake the practice during the working day but might defer it to a weekly or monthly meeting, on or off site. In a hospital setting where the patient's course of care is likely to be directly influenced it might happen instantaneously.
Emergent: The Interesting Case is an emergent practice as it has a long history in the profession of sonography and changes over time are dependent upon contexts and circumstances. Development of new equipment and new research changes the practice, as 'seeing something new' might be dependent upon developments in technology or appreciation of diseases. A new approach to workplace practices might emerge from an interesting case as sonographers might extend their examinations, radiologists might review films differently or report the absence or presence of something. An interesting case often creates a new challenge for sonographers, leading them to find new knowledge, skills or dispositions.

Practice: *The Film Library*
Sayings: The sayings around the film library are often related to teaching related to teaching or pending examinations. A more senior member of staff might pull some films from the library in a time that's not busy and question the student or ask a student if they would like to go through the film library to ask questions or test themselves (particularly if coming up to an exam), or it may be a scheduled tutorial with a number of students.
Doings: The doings around the film library include the collecting, de-identifying and filing of films, or renaming and sorting of digital files on the PACS. When accessed for teaching, these must be retrieved and displayed, and this forms the basis of discussion between any numbers of people. It can typically be a single sonographer and student, a tutor sonographer with a group of students, a tutorial session with a tutor/senior sonographer and other sonographers and students or radiologist(s) with sonographers and students. It is similar to the interesting case, and the interesting cases might be drawn on from the film library.
Embodied: The practice of collecting for the film library, de-identifying studies, sorting through them for items of interest and using these with others in a teaching setting is an embodied practice. The film library represents a cross section of results from imaging studies and may include follow-up CT scans, MRI's PET scans etc., which themselves involve practitioner's bodies coming in contact with patient's bodies and the histories of those bodies. It is professionally embodied in that it provides a sense of teamwork and identity for the professionals involved and a sense of creating a good work environment through caring about quality and patient outcomes.
Materially mediated: The creation of the film library is mediated by combining the bodies with the materiality of the films, film production, digital image collection and storage facility, etc. Other important things like protocols, working histories, and the culture of film collecting and teaching in a particular site mediate the film library. The contents of the film library will shape the interactions staff has with it and the teaching that occurs from it. The selection of films from the library for teaching can be mediated by corporate memory of past findings, critical incidents such as missed diagnoses, etc.
Relational: The existence of, format of and contents of the film library occurs in relation to other practitioners, and constitutes social interactions, arrangements and relationships. Social interactions occur when teaching happens from the film library. Arrangements such as tutorial sessions and relationships such as formal designations of tutor(s) and student(s) who use the library stem from the 'myriad ways' (Shatzki, 2005, p. 474) that practices are relational.

Situated:
The film library can be understood as a situated practice, in use in particular settings such as work areas, tutorial rooms and offices. It is situated in times and spaces, for example it may be brought out in quiet times, saved for tutorials or prompted by events and in shared understandings (e.g. understandings of the roles of tutor and student, of past experiences, of jargons or terminologies or of consequences). The film library, through its teaching role, supports and informs practitioners' practices.

Emergent:
Film libraries have a history in the profession. One example is a beautifully catalogued collection of ultrasound teaching films covering an entire wall of a sizeable meeting room at a large metropolitan hospital in Melbourne, Australia from which it was possible to choose films for examinations of sonographers in the early days when only a professional body qualification was available. In the teaching program at the centre of the research, boxes of films arranged by anatomic part are used for tutorials and the teaching team might seek to supplement these by visiting sites with particular expertise, or clinical supervisors or past students may make donations of such collections for use in the course, thus they are emergent in content and intent. The portfolio assessment in the course represented a film library (with added information) to some of the participants interviewed.

Practice: *The Staff Meeting*
Description: At routine staff meetings, sonographers and other workers discuss workplace issues as team members in a particular setting. Sonographers may be involved in discussions about administrative practices like appointment making and Medicare rebates, and the consequences of these on the way ultrasound examinations are carried out, for example, that examinations on the abdomen and the pelvis will not be reimbursed if conducted on the same day. They may be involved in discussions around how what they do impinges on the radiologists, radiographers, referrers, administrative staff and others. Staff meetings might occur regularly, e.g. fortnightly or monthly, or on an ad hoc basis. There is usually a number of different staff in attendance, depending on who is 'rostered on' (or off). Even if they were not physically present, staff may still engage in discussions or ongoing actions from the Minutes of the meeting (often pinned up in the tearoom or put on the intranet).
Sayings: The sayings of a staff meeting might involve the organiser checking on people who are attending and asking for items for the agenda, preparing minutes and discussing workflows for maximum attendance.
Doings: The doings of the staff meeting include setting up a table and seating, there might be refreshments provided which are organised beforehand, there is someone chairing and someone taking minutes or it may be less formal. There are people representing the jobs of all the different staff in the workplace people talking, discussing, interjecting, and resolving to undertake future actions.
Embodied: The staff meeting is a routine activity for sonographers, occurring in particular locations at particular times in most settings (indeed as it is for most workers). Most participants are physically present and at the meeting, most people's roles are well defined; certain elements of the meeting identify some workers as sonographers as others are identified in the professions or by the roles they play in the workplace.
Materially mediated: The staff meeting usually requires a physical space, table, chairs, computers to record minutes and other material requirements. It is also mediated by the requirements of new legislation, new Medicare rules, new protocols emerging from governing bodies, research findings, budgeting imperatives, new equipment and so on, any of which may impact on the department and any aspect of a sonographer's practice.

| **Relational:** |
| Staff meetings are relational in that each professional might bring issues to bear that impact on other professions/professionals. The senior administrator might bring issues of changes to the Medicare rebate which impacts on how sonographers practice. For example, recent changes to government rules for knee ultrasound have limited the rebate to a few select medical indications. In one practice, when this was raised at a staff meeting, it was decided that a sonographer must assess all requests for knee ultrasounds before the patient was booked in for a scan. The practices of the sonographers and the booking clerks have thus changed in relation to one another. |
| **Situated:** |
| Staff meetings are situated in particular social, political and cultural discourses involving personal agendas, values and past experiences. The interaction of the dynamics of the meeting and the personalities involved may influence the outcomes of the actions taken. |
| **Emergent:** |
| The purpose of the staff meeting is generally to ensure a smoothly functioning workplace that complies with changing imperatives. Each staff meeting carries with it the emerging actions of the last, and of the collective experiences and creates further actions based on these. |

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