

**Shaping Up for Success: A Qualitative Case Study on the Impact of Using
Interactive Radar Graphs on Workplace-Based Assessment Practices for
Pharmacy Interns in Ireland**

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This thesis is submitted in partial fulfilment of the requirements for the degree
of Doctor of Philosophy.

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This thesis results entirely from my own work and has not been offered previously for any other degree or diploma.

This thesis conforms to the maximum word-length permitted.

Signature

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Abstract

As competency-based health professions education is implemented more widely, the use of workplace-based assessment (WBA) has increased. WBA involves assessment of trainees in the workplace based on observation of performance against structured competency frameworks or using specific WBA tools. In Ireland, pharmacy interns are assessed against a 178-item behavioural checklist by a tutor as part of formative and summative assessments during training. This leads to the generation of large numbers of ratings which may prove challenging to interpret. This thesis aimed to explore how a novel information visualisation tool (Visualisation Tool) designed to support this process and explore how its introduction could impact on WBA practice. An activity theory-based methodology approach was used to first consider current WBA practice (using document analysis and focus groups) before exploring the potential of the Visualisation Tool to influence practice (using a double-stimulation user testing method). The findings indicated that current WBA practice is unexpectedly complex and many challenges were identified. Participants used technology to enter and record ratings, to review ratings, and as a point of reference during review meetings. Using the visualisation addressed problems relating to reductionism, allowed participants to more readily interpret the data, and allowed time in the review meeting to be used more efficiently so that the intern and tutor could prioritise discussion of specific areas of concern. The activity theory-based study design facilitated an in-depth analysis of the role of technology in practice. This study highlighted that technology is one of several, interrelated tools used in WBA and that

while technology-based innovations may address some specific issues, a broader, system-level approach is required to address all issues identified as arising in WBA . These issues should be considered in the context of the overall WBA practice rather than in isolation, and researchers should avoid overestimating participants' estimation of the role of technology.

Contents

Abstract.....	iii
List of Figures.....	x
List of Tables	xi
Acknowledgements	xii
Dissemination of Doctoral Programme Work.....	xiv
Abbreviations	xvi
Chapter 1: Introduction	1
1.1 Background	1
1.1.1 Key Terminology in This Thesis.....	1
1.1.2 Thesis Primary Aim, Argument, and Choice of Theory- Method	3
1.2 Introduction to CBME	4
1.3 The Research Context, CBME-based Education, and Study Objectives.....	12
1.4 A Personal Perspective on the Reserach	15
1.5 Anticipated Contribution to Knowledge	17
1.6 Thesis Structure.....	19
1.7 Chapter Summary.....	22
Chapter 2: Context for the Study	23
2.1 Introduction	23
2.2 Main Stages of CBME, WBA and Technology Use in the National Pharmacy Internship Programme in this Thesis Context.....	25
2.2.1 Stage 1: Pharmacy Education in Ireland and the National Pharmacy Internship Programme (c. 2009).....	25
2.2.2 Stage 2: Towards Competency-Based Education (2009- 2014).....	26
2.2.3 Stage 3: National Pharmacy Internship Programme (2014- date).....	32

2.2.4	Stage 4: The Compass Visualisation Tool Development (2015)	35
2.3	Researching the Visualisation Tool	44
2.4	The NPIP, CBME and the Principles of WBA	44
2.4.1	The NPIP and Assessment in CBME: Potential Strengths and Limitations.....	46
2.4.2	Mapping Steps of NPIP WBA to other Published Research.....	48
2.4.3	WBA Tools and the NPIP	57
2.4.4	Radar Graph Visualisations in Assessments of Competence.....	60
2.4.5	How the Literature Review Informed the Research Aim and Objectives.....	64
2.5	Current Issues in CBME and WBA Relevant to this Thesis.....	66
2.6	Chapter Summary.....	68
Chapter 3: Theoretical Frameworks and Methodology		70
3.1	Introduction	70
3.2	Theory in Research	70
3.3	Theory and Research ‘Quality’	71
3.4	Identifying a Theoretical Framework.....	72
3.4.1	The Research Aim and Objectives	73
3.4.2	My Influence on this Research.....	73
3.5	From the Research Aim and my Influence to Practice Theories	76
3.5.1	Rationale for Choosing Activity Theory.....	77
3.6	Activity Theory as a Theoretical Framework	78
3.6.1	Marx and the Foundations of Activity Theory; Consciousness, Dialectical Materialism and Practical Critical Activity.....	79
3.6.2	From Marx to Vygotsky’s Concepts of Mediation, Internalisation and Zone of Proximal Development	81
3.6.3	Criticisms and Limitations of Activity Theory	92

3.6.4	Activity Theory – a Brief Comparison with Other Theoretical Frameworks.....	92
3.6.5	Summary of Theoretical Framework	94
3.7	From Theoretical Frameworks to Research Design.....	94
3.7.1	From Theory to Methodology (Research Paradigm)	94
3.7.2	From Methodology to Design and Ethics	96
3.7.3	From Design and Ethics to Data	98
3.8	Chapter Summary.....	99
Chapter 4:	Exploring Existing Practice Using Activity Theory	103
4.1	Introduction	103
4.2	Activity Theory Principles and Methods	104
4.2.1	Activity Theory Principles and Implication for Selection of Methods.....	104
4.2.2	Choice of Methods	106
4.3	Document Analysis	108
4.3.1	Data Source Identification.....	108
4.3.2	Data Analysis	111
4.3.3	Document Analysis Findings	117
4.3.4	Document Analysis Strengths and Limitations.....	119
4.3.5	Summary of Document Analysis	120
4.4	Focus Groups	120
4.4.1	Focus Group Method and Theoretical Considerations.....	121
4.4.2	Participants and Procedures	121
4.4.3	Data Analysis and Findings.....	124
4.5	Discussion of Key Findings	144
4.5.1	Current WBA Practice	144
4.5.2	Strengths and Challenges of NPIP WBA Practice	145
4.5.3	Role of Technology in WBA Practice.....	152

4.6	Chapter Summary.....	154
Chapter 5: User Testing and Practice Observations.....		155
5.1	Introduction	155
5.2	Background	155
5.3	The Role of Compass in WBA.....	157
5.4	Activity Theory, ZPD, and the Double-Stimulation Method.....	159
5.4.1	Zone of Proximal Development	159
5.4.2	Double-Stimulation Experiment	160
5.5	Using Compass to Review Ratings before Review Meeting	162
5.5.1	Participants and Procedures	162
5.5.2	Research Procedures	164
5.5.3	Findings and Data Analysis.....	167
5.5.4	Summary	189
5.6	Compass and Visualisation Tool Use During Review Meetings	189
5.6.1	Theoretical Considerations.....	190
5.6.2	Participants and Procedures	190
5.6.3	Data Analysis and Findings.....	193
5.7	Discussion of Findings.....	219
5.7.1	Zone of Proximal Development	219
5.7.2	Use of Compass and the Visualisation Tool	222
5.7.3	Elaborating WBA Practice	223
5.8	Chapter Summary.....	226
Chapter 6: Conclusions and Implications		227
6.1	Introduction	227
6.2	Symoptic Overview of Study Elements	227
6.2.1	Document Analysis	230
6.2.2	Focus Groups.....	231
6.2.3	User Testing	233

6.2.4	Practice Observations	241
6.3	Addressing the Aims and Objectives of the Research	234
6.3.1	Current Practice	235
6.3.2	How Technology is Used	238
6.3.3	The Role of Theory	239
6.3.4	Summary	241
6.3	Contributions of this Research to Knowledge	242
6.4	Implications for CBME/WBA Practice	243
6.5	Study Limitations	244
6.6	Further Research	245
6.7	Concluding Remarks	246
	References	247
	Appendix A	274
	Appendix B	277
	Appendix C	281

List of Figures

Figure 1.1.	Overview of the Research in This Thesis.....	18
Figure 2.1.	Overview of the Main Stages of CBME/WBA Development	24
Figure 2.2.	The eportfolio software used 2009-2014.	30
Figure 2.3.	The PSI Core Competency Framework for Pharmacists.....	33
Figure 2.4.	Screenshot of Compass.	34
Figure 2.5.	Radar graphs produced by the Compass Visualisation Tool.....	37
Figure 2.6.	Visualisation Tool Interactive Graphs.....	38
Figure 2.7.	Viewing Related Domains, Competencies and Behaviours.....	39
Figure 2.8.	Visualisation of Intern Development Over Time.....	41
Figure 2.9.	Comparing Individual Intern to the Overall Cohort.....	42
Figure 2.10.	Setting up a Compass Moodle Instance	43
Figure 3.1.	Vygotsky’s Basic Triangular Structure.....	82
Figure 3.2.	Leontiev’s hierarchy of activity, actions, and operations.....	85
Figure 3.3.	Engeström’s basic unit of analysis, the activity system.	87
Figure 3.4.	The revised unit of analysis.....	89
Figure 4.1.	Unit of Analysis	104
Figure 4.2.	Document Analysis Findings Mapped to an Activity System	116
Figure 4.3.	Intern Focus Group.....	124
Figure 4.4.	Tutor Focus Group	124
Figure 4.5.	Activity System with Data from the Intern Focus Group.	134
Figure 4.6.	Activity System with Data from the Intern Focus Group.	141
Figure 4.7.	Activity System with Data from Both Focus Groups.	143
Figure 5.1	How Compass Was Used in Practice for WBA.	158
Figure 5.2.	Room Layout for User Testing.....	163
Figure 5.3.	Data collection using video camera.	166
Figure 5.4.	Data collection using screen capture software.	166
Figure 5.5	Positioning the Recording Equipment to Record Screen.	192
Figure 5.6	Recording Device Placement to Record Multiple Angles.....	194
Figure 5.7	Recording Practice Observation 2 in the Dispensary	203
Figure 5.8	Recording Practice Observation 3 in the Meeting Room.....	203

List of Tables

Table 1.1.	Key Terms and Definitions Used in This Thesis	2
Table 2.1.	Overview of the CoDEG Framework used in the NPIP 2009-2014	28
Table 2.2.	Summary of Best Practice Features in CBME Assessment	47
Table 2.3.	Overview of Five Common WBA Tools	59
Table 2.4.	Detailed Review of Studies of Radar Graphs used in Health Professions WBA	62
Table 3.1.	Definitions of the Elements of the Activity System.....	88
Table 3.2.	Engeström’s Four Levels of Contradiction	90
Table 3.3.	Overview of how Activity System Elements Impact Choice of Methods.....	99
Table 3.4.	Overview of Quality in Qualitative Research in Thesis.....	101
Table 4.1.	Data Sources Identified for Document Analysis for Interns and Tutors...	110
Table 4.2.	Illustrative Examples of Text from Sources Used to Identify Intern Activity System Elements in Document Analysis	112
Table 4.3.	Illustrative Examples of Text from Sources Used to Identify Tutor Activity System Elements in Document Analysis	114
Table 5.1.	Examples of Simulated Ratings: Domain 1, Competency 1.1.	162
Table 5.2.	Preliminary Review Data from User Testing.	168
Table 5.3.	Preliminary Review Data from Practice Observations.....	193

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“There is a crack, a crack in everything, that’s how the light gets in”

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Abbreviations

ANT	Actor-Network Theory
CbD	Case-Based Discussion
CBE	Competency-Based Education
CBME	Competency-Based Medical Education
CCF	Core Competency Framework for Pharmacists
CoDEG	Competency Development and Evaluation Group
CPD	Continuing Professional Development
DOPS	Direct Observation of Clinical Skills
EPA	Entrustable Professional Activity
eportfolio	Electronic Portfolio
FIP	International Pharmacy Federation
GDP	Good Distribution Practice
HCI	Human-Computer Interaction
HPEC	Health Professions Education Centre
ICBME	International Competency Based Medical Education Collaborators
IT	Information Technology
M.Pharm	Master in Pharmacy
Mini-CEX	Mini-Clinical Evaluation Exercise
Mini-PAT	Mini-Peer Assessment Tool
N/A	Not Applicable
NPIP	National Pharmacy Internship Programme
OBE	Outcomes-Based Education
OTC	Over-the-Counter [Medicines]
PDF	Portable Document Format
PEARs	Pharmacy Education and Accreditation Reviews

PhD	Doctor of Philosophy
PSI	Pharmaceutical Society of Ireland
®	Registered Trademark
RCSI	Royal College of Surgeons in Ireland
SCORM	Sharable Content Object Reference Model
TEL	Technology-Enhanced Learning
TTAP	Tutor Training and Accreditation Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
VLE	Virtual Learning Environment
WBA	Workplace-Based Assessment
WHO	World Health Organisation
ZPD	Zone of Proximal Development

Chapter 1: Introduction

1.1 Background

The purpose of this chapter is to set the scene for the research in this thesis. This is achieved through describing the study aim and objectives, explaining key terminology used, and situating the research in the field of competency-based medical education (CBME) and workplace-based assessment (WBA). An overview of the activity theory-based theoretical and methodological approaches used to address the research aims in this thesis is also provided.

The overarching aim of this study is *to explore how the introduction of a novel Visualisation Tool affects the workplace-based assessment practices of pharmacy interns and tutors in Ireland*. The objectives relating to this aim will be unpacked and discussed in more detail in this chapter. Studies on the role of technology in CBME have to-date failed to explore how new technology impacts on existing practice, instead focusing on particular attributes or functionality of the technology itself. Therefore, this thesis aims to add a new perspective to this literature by considering technology from the perspective of practice.

1.1.1 Key Terminology in This Thesis

A systematic review by Frank, Mungroo, et al. (2010) highlighted that a significant issue in the CBME/WBA literature is the variation in terminology used by authors. The lack of consensus of consistency in definitions is cited as a limitation to the advancement of the field of study. In this thesis, I use the definitions of competence and competency proposed by Frank, Mungroo, et al. (2010) but have adapted them slightly for relevance to this thesis by replacing references to the medical profession with pharmacy. They are listed in Table 1.1 below with other key terms for this thesis.

Table 1.1. Key Terms and Definitions Used in This Thesis

Term	Definition
Competence	The array of abilities across multiple domains or aspects of pharmacist performance in a certain context. Statements of competence require descriptive qualifiers to define the relevant abilities, context, and stage of training. Competence is multi-dimensional and dynamic. It changes with time, experience and setting (Frank, Mungroo, et al., 2010).
Competency	An observable ability of a health professional, integrating multiple components such as knowledge, skills, values and attitudes. Since competencies are observable, they can be measured and assessed to ensure their acquisition. Competencies can be assembled like building blocks to facilitate progressive development (Frank, Mungroo, et al., 2010).
CBME	Originally intended for use in medical education, is a generally accepted term used for competency-based education in all health professions, and is used as such in this thesis. This recognises that in practice, the approaches used in pharmacy education are the same as those in medical education (Westein, de Vries, Floor, Koster, & Buurma, 2018). I avoid using 'CBPE' as this more usually stands for community-based participatory engagement. I avoid using CBE as it represents more general competency-based education, which overlooks the peculiarities of educating of health professions students.
Faculty Development	A process where medical school faculty, clinical faculty, associated faculty, preceptors, trainers, or in this case tutors participate in activities designed to renew or assist faculty in their academic roles, including teaching, administration, or research. It may take many forms including local programmes, workshops, seminars, organisational strategies or qualifications. In teaching, it is intended to result in better teaching performance and better learning outcomes for students (Steinert et al., 2006).
Intern	A trainee pharmacist who is registered as a student on the National Pharmacy Internship Programme. Works under the supervision of a tutor pharmacist for 12 months and completes coursework. Periodically completes self-assessment against the Core Competency Framework for pharmacists and plans development with tutor (PSI, 2008).
Tutor	A pharmacist who is trained to supervise interns for part/all of their training year. Forms part of wider clinical faculty and completes training (faculty development) periodically. Must have at least 3 years post-registration experience, and a minimum of one in the area of practice in which they are acting as a supervisor (PSI, 2008). Assesses the intern at set intervals against the Core Competency Framework and provides feedback and coaching. Synonymous with 'mentor' in this thesis.
Core Competency Framework	A consensus based competency framework for pharmacists in Ireland developed by the pharmacy regulator in Ireland (PSI, 2013) based on global pharmacy competency frameworks and consultation with members of the pharmacy profession. Consists of a hierarchy of domains, competencies, and behaviours designed to represent the level of competence expected from pharmacists in Ireland. Its use as a framework for pharmacy education in Ireland is mandatory.

Term	Definition
Workplace-based Assessment	Assessment of trainees within the workplace using particular tools (Massie & Ali, 2016). In this thesis it refers to the process where intern self-assessment against using a competency framework is followed by a tutor assessment and review meeting. The assessment is based on ratings against the Core Competency Framework.
Compass	A technology ('Moodle plug-in') developed specifically to facilitate competence assessment via the virtual learning environment Moodle. Allows users to assess themselves/others against checklist-based competency frameworks using defined rating scales. Users enter and ratings and they are aggregated, tabulated and stored in Moodle.
Visualisation Tool	A reporting system designed to work with Compass. It allows users to reconfigure the data tabulated in Compass using radar graphs. Users can interact with the Visualisation Tool to configure the data in a number of ways.

1.1.2 Thesis Primary Aim, Argument, and Choice of Theory-Method

The primary aim of this thesis relates to study of a new tool being introduced to *practice*. Schön (1987, p. 4) famously describes practice as “messy, indeterminate situations”, highlighting the methodological challenges facing any researcher seeking to study practice. While designing this study I identified that most researchers isolate and focus narrowly on one element of WBA rather than attempting to study practice as a whole. For example, several studies focus on various interpretations of rating scales, rather than considering how these variations in rating fit into an overall WBA. Perhaps this links to the ‘reductionist’ tendencies of CBME which ‘lends itself to tidying up those parts of practice that can be tidied up, but its danger is that inappropriate application could devalue those parts of the essence of practice that is inherently messy; particularly complicated, human ones’ (Morcke, Dornan, & Eika, 2013, p. 861). I sought to ensure that my research approach did not artificially fragment the process in this way.

A core argument of this thesis is that more empirical, observational research, framed using an appropriate practice theory can assist the comprehensive consideration of

issues with WBA and help researchers understand the impact of innovations designed to address these challenges. Therefore, the first step should be to thoroughly explore and model existing practice. If looking to consider the impact of innovations, the role of the technology should be considered within this model of existing practice.

I describe the rationale for the choice of the theoretical framework in Chapter 3, before explaining how it aligns with the methodology and methods employed. I use an activity theory framework to study the WBA practices. Activity theory is particularly appropriate for this study as it is an established lens for studying practices, the role of tools, and development (Nicolini, 2012, p. 109). It is also a well-established theoretical framework used in human-computer interaction studies (Kaptelinin & Nardi, 2018) which makes it particularly relevant for this study.

1.2 Introduction to CBME

CBME is a new frontier. There is no roadmap for success; we must chart our own path. But we have all the tools we need to succeed: engaged faculty and learners, curricular guidance from our certifying colleges, and significant local expertise in education innovation and research. If we all work together, we can lead the way in bringing CBME to life. We owe it to our patients. We owe it to our communities. We owe it to our learners.

–Watling (2018)

In 1910, the famous Flexner Report was published with the intention of revolutionising healthcare education to improve training of physicians (Flexner, Pritchett, & Henry, 1910). Flexner emphasised the need for a defined structure for medical curricula that emphasised the basic as well as clinical sciences, proposing a structure comprised of two years study of basic sciences followed by two years of clinical studies (Cooke, Irby, Sullivan, & Ludmerer, 2006). This structure was adopted for the majority of the 20th century in medical and health professions schools

worldwide. During this time, assessment of medical and healthcare professional trainees was predominantly based on written tests of knowledge. Passing these exams and subsequently completion of a training programme was sufficient to demonstrate readiness for independent clinical practice (Frank, Snell, Englander, & Holmboe, 2017). This approach worked well in the first half of the 20th century where required knowledge and skill were relatively limited. Flexner himself could not have foreseen the exponential developments in the medical sciences that would come over the next hundred years and the impact on healthcare professionals' education requirements (Ludmerer, 2010). Ongoing consensus-based concern that existing educational approaches were not sufficient to ensure patient safety (Skochelak, 2010), combined with high-profile reports that patients were at significant and increasing risk of adverse events and diagnostic errors (Kohn, Corrigan, & Donaldson, 2000), led educators and regulators to look for alternative methods that could improve patient safety.

Competency-based medical education (CBME) has been gathering momentum as a 'new' approach with the potential to improve education and therefore patient safety in recent years. It is generally defined as “an outcomes-based approach to the design, implementation, assessment, and evaluation of a medical education program using an organizing framework of competencies” (Frank, Snell, et al., 2010). Positioned as a means to educate and assess the next generation of healthcare professionals, advocates suggest that this approach can ensure that healthcare professionals have skills that will be responsive to, and accountable for, the needs of the healthcare systems and communities in which they practice (Frenk et al., 2010). It has been widely adopted in the training of healthcare professionals at undergraduate, postgraduate, and continuing education levels, and is popular with accreditation bodies due to its perceived learner-

centredness and apparent transparency (Carraccio, Wolfsthal, Englander, Ferentz, & Martin, 2002). Other cited benefits of CBME include a focus on outcomes and abilities rather than trainees' personal attributes, and removing an artificial focus on time in training (Frank, Snell, et al., 2010). It opens up the possibility of overcoming the challenges of the existing models of practice, for example, where how much time learners spend in a certain context is emphasised over what they learn there (sometimes known as 'the tea bag model') (Snell & Frank, 2010).

Outside the realm of medical education, competency-based education (CBE) has more generally seen a resurgence in use in higher education. Like medical education, the primary reasons reported for its increased popularity relate to demonstration of accountability and outcomes, but unlike medical education, a key driver appears to be a perception of cost-effectiveness (Burnette, 2016, p.85). CBE curricula that include elements of workplace-based learning are thought to promote university-business connection and improve students' future employability (Jackson, 2013) and integration into the employment market (Gómez, Aranda, & Santos, 2017). Within general higher education, this may be linked with a concerning focus on higher education as a market, where "the outcome sought is not an educated person in the classical sense, but an accredited person able to use their educational outcomes (or competencies) to further their economic desires" (Gibbs, 2001, p. 87). This resonates somewhat with the concern that CBME focuses only on the easily measurable, and may promote a reductionist approach with "the liberal and learned practice of medicine...overrun by simplistic checklists representing unproven managerial mandates" (Lurie, 2012, p. 51). Overall, however, the CBE discourse sits somewhat at odds with the CBME literature in terms of rationale and focus, where the primary reasons for adopting competency-based approaches link strongly to regulatory

requirements and issues of patient safety rather than cost-effectiveness and employability. Because of the specific focus of health professions and the scope of this research, in this thesis I generally refer specifically to the CBME rather than wider CBE literature.

Moving back to CBME specifically, many strong proponents believe that this approach is fundamentally essential to the provision of high-quality health education and healthcare in modern society (Parent, Jouquan, & De Ketele, 2012). Although less established than in medical programmes, competency-based approaches are increasingly featured in pharmacy education publications, where the same potential benefits and challenges are described (Koster, Schalekamp, & Meijerman, 2017). Recent developments in pharmacy have included aiming to develop definitions of competence (Waterfield, 2017), and consensus-based competency frameworks (Atkinson et al., 2016).

While CBME has become almost universally (if not somewhat uncritically) accepted as an approach in health professions education, it is worth considering its origins at this point. Morcke et al. (2013) carefully trace the origins of CBME (which they refer to more generally as outcomes-based education or OBE) through a number of stages of development. They describe the ‘first cycle of advocacy and critique’ starting in the 1960s which was associated with Sputnik I and the ensuing space race. This cycle originated from the popular behaviourist psychology of the 1940s, and was heavily influenced by the work of Tyler (1949), the cognitive domain identified by Bloom (1956), and the work of Gagne and Briggs (1974) on instructional design. It emphasised explicit educational objectives, expressed in terms of the changes learning would have on the behaviour of students. It lasted until the 1970s when this approach

was highlighted as failing to accommodate many important features of education including values and judgement (Stenhouse, 1975). Spady (1988) led a revival of OBE in the 1980s, again avoiding affective elements of education and focussing on behavioural outcomes. In Europe, the commencement of the Bologna process in 1999 and corresponding focus on learning outcomes meant further revival of behaviourism in higher education policy and practice (Murtonen, Gruber, & Lehtinen, 2017).

The earliest reference to competency-based approaches in healthcare are from the 1970s (McGaghie, Sajid, Miller, Telder, & Lipson, 1978), although it took much longer to become fully established. The introduction of OBE in medical education as the precursor to CBME occurred when an influential medical educationalist brought Spady's work to the attention of the medical education community. Ronald M Harden (1999, p. 13) presented OBE to the medical education community, identifying several potential advantages for training doctors. He suggested that it should be adopted as a model for curriculum planning, despite noting that there was limited research underpinning the approach. Primarily due to his and others' influence, over the next number of years learning outcome-based approaches became widely adopted and formed the basis for curriculum content, teaching methods, and assessments (Shumway & Harden, 2003, p. 570). This has more recently culminated in calls for the wholesale adoption of CBME (Irby, Cooke, & O'Brien, 2010). Competency-based education methods require competency frameworks upon which to base their teaching and assessments. Several have been developed, including global competency frameworks such as the widely used CanMeds framework (Frank, 2005; Frank & Danoff, 2007), as well as those intended for specific professions and/or jurisdictions. Widespread similarities between competency frameworks developed for different professions have been identified, which is promising for the enhancement of team-

based care (Sánchez-Pozo, 2017). Regulatory bodies have been moving to mandate the use of competency-based approaches in a number of health professions education programmes, particularly in Canada, the United States, the United Kingdom, and the Netherlands (ten Cate & Scheele, 2007, p. 542).

While many prominent medical educators have expressed support for the CBME movement, there are many who express reservations. Based on its strong roots in behaviourist psychology some critics feel that there is a gap between the ‘outdated theoretical orientation and modern learning theory’ (Morcke et al., 2013, p. 856).

Others question the basis of CBME on frameworks developed by consensus methods, querying whether the resulting competencies reflect actual behaviours and if they can therefore be measured (Lurie, 2012, p. 53). Whitehead, Selleger, Kreeke, and Hodges (2014) express concern that many competency frameworks do not take sufficient consideration of the learner as a person, while others believe CBME overlooks the importance of professional identity development (Jarvis-Selinger, Pratt, & Regehr, 2012). As well as these conceptual concerns, there are a number of practical concerns associated with the implementation of CBME including increased administrative and technology requirements (Hawkins et al., 2015, p. 1088), cost (van der Vleuten & Heeneman, 2016), difficulties in defining the terms in CBME (Frank, Mungroo, et al., 2010), and a need for faculty development (Holmboe et al., 2011). Many generally lament the fundamental lack of evidence to support this movement which plays a prominent role in health professions today (Whitcomb, 2016).

Despite these conceptual and practical concerns, regulatory stipulations have required many programmes to adopt a CBME orientation. A key feature of CBME programmes is workplace-based assessment (WBA) (Gruppen et al., 2016; Koster et al., 2017),

which forms the core focus of this thesis. When implementing CBME programmes, faculty have therefore been required to reframe their assessment strategies to include WBA. Including WBA in medical educational programmes means that learners are assessed in the clinical environment, usually under graded supervision levels (Kogan & Holmboe, 2013). The strength of WBA as assessment in CBME programmes lies in the ability to review what learners actually do in practice rather than in a university or simulated environment (Swanwick & Chana, 2009). Assessing what a learner ‘does’ has long been considered the goal of assessment in medical education (Miller, 1990; Wass, van der Vleuten, Shatzer, & Jones, 2001). Definitions of WBA are numerous, a recent example describes it as “any assessment, tool, or method designed to provide feedback on performance and improve performance in a practice setting” (Barrett, Galvin, Steinert, Scherpbier, O’Shaughnessy, Horgan, et al., 2016, p. 1190). WBA is most commonly used as formative assessment, not associated with grades or progression decisions (Wass et al., 2001). Feedback provided after WBA helps motivate learners and supports competence development (Norcini & Burch, 2007; Tekian, Watling, Roberts, Steinert, & Norcini, 2017). Many assessment tools (see Section 2.7.3) are used, often in combination, to assess performance in workplace-based settings (Kogan, Holmboe, & Hauer, 2009). Implementation of WBA requires consideration of practicalities, assessment quality, faculty development, and acceptability to learners and clinical faculty (Fokkema et al., 2013; Govaerts & van der Vleuten, 2013; Hauer, Holmboe, & Kogan, 2011; Moonen-van Loon, Overeem, Donkers, van der Vleuten, & Driessen, 2013; Oerlemans et al., 2017, p. 304).

Despite this, there is increasing concern that WBA is not achieving its potential. Some key challenges include faculty being unable to provide sufficient feedback due to competing clinical roles (Barrett et al., 2016; Bok et al., 2013), insufficient faculty

development (training) (Holmboe et al., 2011; Walsh et al., 2018), problems with using assessment forms and rating scales (Crossley, Johnson, Booth, & Wade, 2011), and lack of clarity around frameworks leading to poor application (Norman, 2005). To-date, the challenge that has been studied in most detail relates to how assessors use rating scales as part of WBA. Unintentional variation due to factors other than learner performance is reported (Kogan, Conforti, Bernabeo, Iobst, & Holmboe, 2011; Yeates, O'Neill, Mann, & Eva, 2013). While it is possible to reduce this variation through improved design of rating scales (Crossley et al., 2011) and enhanced faculty development (Conforti, Ross, Holmboe, & Kogan, 2016), a key part of WBA is assessing learner performance accurately. While these studies are helpful in identifying problems with WBA, the predominant reliance on survey, interview and retrospective analysis techniques means that how these challenges manifest as problems in the practice setting is unclear.

In order to address these challenges, several innovations have been developed to facilitate data collection, often using smartphone-based software. This includes portfolios and web-based systems to link assessment and documentation processes (Sood & Singh, 2011). However, in most cases it is unclear from the literature how this technology is developed, operates, or is evaluated as these innovations tend to be reported as part of larger studies relating to WBA. This makes it impossible to fully understand the role of technology in WBA. Bok et al. (2013) note that technology itself can give rise to problems, for example 'during patient rounds there is no time to write down feedback in students' digital portfolios'. It appears evident that while the CBME movement has resulted in the widespread adoption of WBA approaches, technology to support this kind of assessment in busy clinical workplaces has been comparatively under-researched.

1.3 The Research Context, CBME-based Education, and Study Objectives

The previous section provides a brief introduction to the wider context for this research which focusses on WBA in a CBME-based postgraduate programme. A more comprehensive discussion of the key literature in WBA is included in Chapter 2. This thesis explores the role of a novel visualisation tool designed to support WBA assessment in a competency-based master's degree programme completed by pharmacy interns in Ireland. While the complete history of the research is comprehensively described in Chapter 2, here I provide a brief summary for background.

In Ireland, pharmacy trainees, known as “interns”, complete 12 months of postgraduate workplace-based training alongside online modules as part of their fifth and final year of study prior to qualification as a pharmacist leading to the award of Master in Pharmacy (M.Pharm). This is known as the National Pharmacy Internship Programme (NPIP). Interns work under the supervision of a dedicated tutor pharmacist, who is responsible for assessing the intern based on ongoing observations at fixed time points during the year. During this time, they are required to complete WBA of the intern's performance as part of an overall programme of assessment. This process is described in detail in Chapter 2. In summary, it comprises of formative and summative self and tutor assessment at a minimum of three points over the 12-month internship. The competency framework used for this assessment is the Core Competency Framework for Pharmacists (the CCF), produced by the Pharmaceutical Society of Ireland (PSI), the pharmacy regulator. This lengthy document details the competencies and behaviours that must be demonstrated by pharmacists at the point of entry to the register. Interns first complete a self-assessment against the 178 CCF behaviours. They individually rate their performance using a defined numerical rating

scale, and record their ratings electronically using a bespoke feature on the virtual learning environment (VLE). The tutor can see these ratings and then completes their assessment, assigning scores using the same framework, scale, and software. All ratings are visible to both parties to facilitate review. The final intended step in the WBA process is a meeting where the intern and tutor meet to discuss the results, any differences, and plan for the intern's development.

While this may sound like a reasonably straightforward endeavour some feedback began to emerge suggesting that the process was proving challenging. This appeared to be mainly due to the number of individual ratings required, and resulting requirement to review and frame a meaningful discussion around the large quantity of data produced. In total, three completed WBAs generated 1068 data points per intern (178 x 2 per WBA), which is a lot of information to discuss. The source of this was primarily the lengthy competency framework, one of many established challenges for CBME-based programmes (Lurie, 2012). A further source of difficulty appeared to relate to interpreting the rating scale, another known problem in CBME (Crossley et al., 2011). As the framework forms part of the statutory requirements for the NPIP, it was not possible to consider changing this approach. Therefore, I sought an alternative approach to presenting the information to interns and tutors to address the identified issues of interpreting the volume of data during their WBA. I collaborated with a developer to design a visualisation extension for the existing software (described in detail in chapter 2). This thesis seeks to study the impact of this visualisation tool on the WBA practices of NPIP interns and tutors and address the main research aim:

Aim: To explore how the introduction of a novel visualisation tool affects the workplace-based competence assessment practices of pharmacy interns and tutors in Ireland.

When considering how to address this main research aim, I identified three objectives to help achieve the aim. Firstly, this thesis focuses on exploring the impact of a visualisation tool in practice. Therefore, I realised I needed to study the existing day-to-day WBA practices of interns and tutors before considering how the visualisation tool might affect it. Based on the feedback from the interns and tutors, I was curious to see if the WBA completed in practice resembled what interns and tutors were advised to do. The literature review identified no empirical studies that could assist me understand how WBA happens in practice, but highlighted a number of theoretical and practical concerns with WBA. Therefore, I also wanted to identify if the theoretical benefits and challenges associated with WBA in the medical education field reflected those manifesting in the NPIP. Therefore, the first objective (addressed in Chapter 4) relates to practice:

Objective 1: To explore current practices, strengths, and challenges in WBA in the NPIP, including the role of technology.

To take another step towards achieving the aim of the research, I identified the need to study the existing approach and the visualisation tool in closer detail to establish how interns and tutors used both versions to make interpretations about the intern's development. Therefore, the second objective (addressed in Chapter 5) relates to the visualisation tool more specifically:

Objective 2: To explore how interns and tutors use Compass with(out) the visualisation tool as part of WBA.

Finally, as I explain in Chapter 2, when completing the literature review I identified that the role of theory in researching WBA has not been well described in the literature. This was highlighted by other authors, with Morcke et al. (2013, p. 862) stating that "the single most pressing scholarly task...is to examine OBE from

theoretical perspectives other than behaviourism; cognitive and social theory”.

Therefore the third and final objective (addressed in Chapters 3 and 6) is:

Objective 3: To explore how using theory contributes to the study of WBA practice.

1.4 A Personal Perspective on the Research

Having qualified and worked as pharmacist for a number of years before moving to academia in 2012, I had tutored three interns on the NPIP. Therefore, I had experience of completing WBA first-hand. Due to my experience as a tutor, of my first academic roles was as a lecturer on the NPIP. Initially, I hoped to use my new role to make swift and significant improvements to the WBA system, which I had found to be confusing, time-consuming, and often technically challenging when in a busy clinical environment. The ‘eportfolio’ technology had always seemed particularly problematic, crashing, losing data, and taking a long time to save any data.

However, my initial ambition was based on a very primitive understanding of how academia worked, particularly in comparison with the healthcare sector. I realised that my initial position had actually been quite naïve (albeit well-intentioned) and had failed to consider the peculiarities of funding, infrastructure and information technology, training, and motivation in academia. I describe this context in more detail in Chapter 2, but in short, upon commencing my academic role it quickly became apparent that a ‘quick fix’ was not realistic.

In 2014, I was appointed as Programme Director for Academic Studies for the NPIP.

At this time, the regulator introduced the CCF that was designed to outline the competencies that should be demonstrated by new pharmacists entering the professional register. Therefore, I was tasked with leading the development of a

revised curriculum that mapped to the CCF and upgrading the virtual learning environment. Still cognisant of the previous challenges with the eportfolio system, and further concerned that the CCF was a longer and more complex, I was now in a position to use some of the project funding to make improvements to the WBA process from a technology perspective. I worked with a software developer to design a tool that would integrate with the VLE (specific details are included in Section 2.2.3). We named the tool ‘Compass’ (derived from **competence assessment**). Implementation was successful, and the technical issues I had first identified in 2012 were resolved. Frustratingly, new problems unrelated to the technology itself became evident. The length of the CCF meant that interns and tutors had to make so many ratings, that they found it difficult to synthesise the data and make determinations about progression.

Still determined to ‘fix’ these new issues, I again turned to technology for an answer. Believing that an approach that would allow users to visualise the ratings would enable them to make better meaning from the numbers, I applied for faculty funding to develop a new tool that would build on the functionality of Compass and allow the ratings entered to be configured visually. Working with the same team, I designed a novel interactive visualisation tool that would integrate with Compass to enable the numerical data to be reported in an interactive radar graph (this is fully described in Chapter 2). This thesis explores the introduction of the Compass visualisation tool at a national level in Ireland.

This study emerges from an overall aim to study the introduction to the tool, and the convergence of three primary interests arising from the experience described above. Firstly, I realised my initial aim to improve WBA solely through improvements in technology with Compass had failed to consider the wider context and actually

generated new problems. Therefore, I was interested in first establishing the context I had failed to consider for Compass. Secondly, I was still interested in closely studying how the visualisations affected the WBA practice, but recognised the importance of studying this from the perspective of users rather than functionality. Thirdly, having come to feel somewhat foolish for my initially technology-focused ‘solution’, I was interested in understanding the role of theory in helping me avoid this for this study and in the future.

1.5 Anticipated Contribution to Knowledge

While the quantity of literature on WBA in medical education has been steadily increasing, and features regularly in the highest-profile medical education journals, the pharmacy education literature is comparatively very limited. Therefore, this thesis will firstly serve to provide insights specific to the pharmacy education discipline itself, and the potential role of visualisation as a method to influence practice.

Harden (1999, p. 13) noted that for CBME, although it had ‘obvious appeal, research documenting its effects is fairly rare’ which was also true for WBA. This remained the case fourteen years later when Morcke et al. (2013) concluded that the health professions WBA literature still lacked empirical studies that comprehensively examine how it works, for whom, and in what circumstances. It is fair to say that not much had improved by 2015 when this study was designed, and calls for empirical studies remain evident in even more recent publications (Gruppen et al., 2017; Holmboe, 2018). This study therefore aims to contribute towards this identified gap.

A further key contribution of this thesis will be the evaluation of activity theory as a practice theory suitable for studying WBA. Furthermore, the thesis contributes to the body of knowledge that has adopted activity theory lenses. At the time of design, no

published WBA studies had employed activity theory as a theoretical framework. In particular, CBME has not been explored via activity theory lenses as adopted here and explained later. Unlike the wider higher education literature, medical education researchers have been generally less concerned with the use of theory. (Barrett, Galvin, Steinert, Scherpbier, O'Shaughnessy, Horgan, et al., 2016). The general lack of theory use in WBA research represents a methodological limitation in terms of the quality of existing published studies. This thesis will therefore contribute to increasing methodological quality of WBA research, and medical education more generally.

On a practical level, the findings from this thesis will serve as a basis from which we can learn about the practices of competence assessment in the NPIP and this will in turn provide rich data that will allow us to understand where to focus resources on programme quality improvement, refinement of assessment methods including WBA, and faculty development. Faculty development is considered one of the most important elements of CBME, and it is generally recognised that lack of appropriate faculty development is a limitation of many CBME programmes, and ultimately a reason why many WBAs do not achieve their intended goals (Holmboe et al., 2011).

In order to provide an orientating overview of this research, the structure of the research in this thesis is presented in graphical form in Fig. 1.1 below. It shows that this study sits within the wider field of CBME/WBA but is undertaken in the specific context of the NPIP. The circles denote the various parts in the research in this thesis. How the parts relate to each other is indicated on the diagram. The research aim and objectives for this study arose from a practice innovation and gaps in the literature identified from a corresponding literature review. An activity-theory framework provided the basis for the empirical study conducted (denoted with a dashed line)

which comprised of document analysis and focus groups to study existing practice (Objective 1), and user testing and practice observations to more closely explore the role of technology, i.e. Compass and the Visualisation Tool (Objective 2).

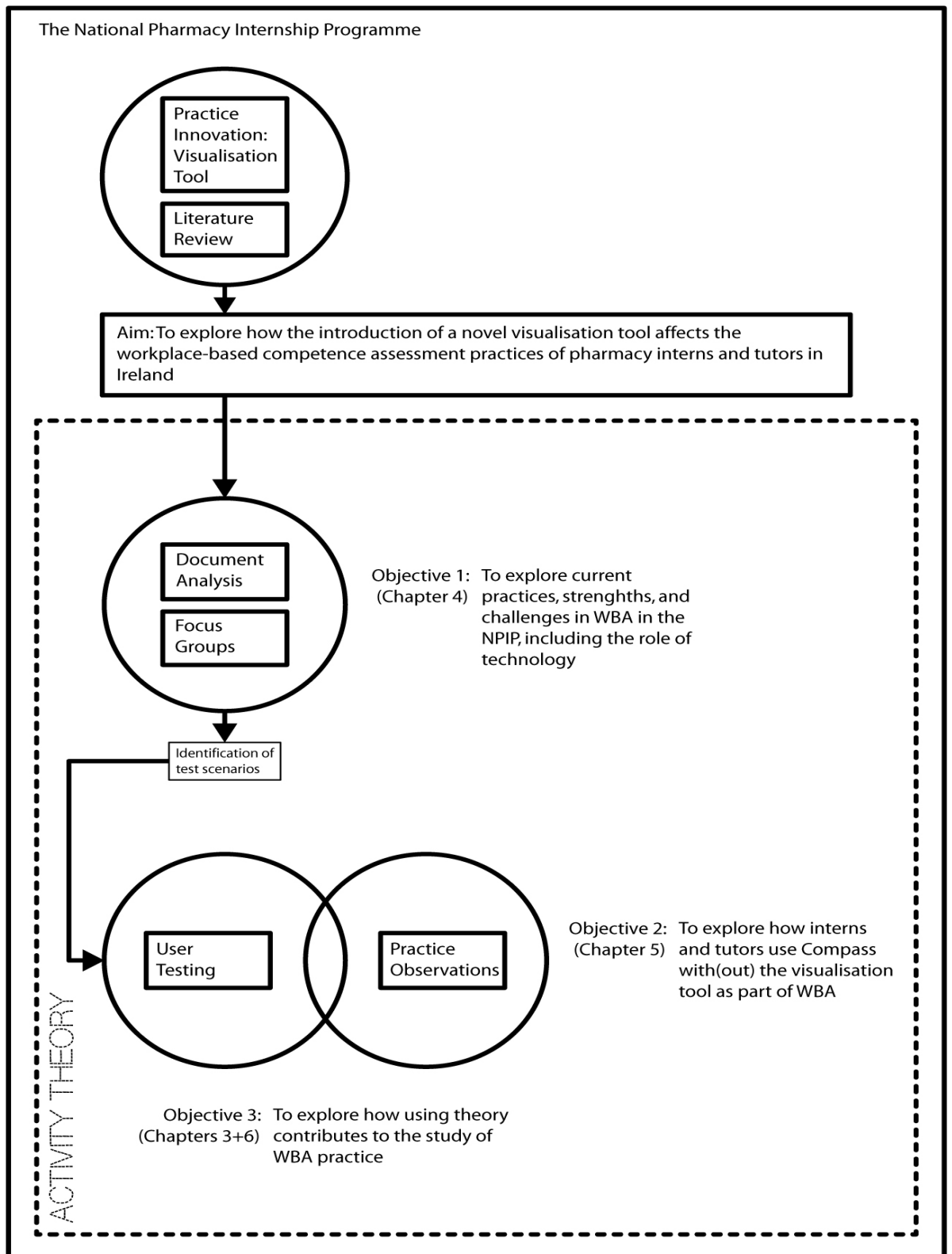


Figure 1.1. Overview of the Research in This Thesis.

1.6 Thesis Structure

In addition to this introductory chapter, there are five further chapters.

Chapter Two: Context for the Study

This chapter explains the origins for the study and how the aims and objectives of this thesis were developed in the context of the NPIP and the development of the Visualisation Tool. In order to situate the research in the context of the wider literature, a critical literature review of literature focussed on WBA practices, the role of technology in WBA, and theoretical and methodological approaches in WBA research is completed.

Chapter Three: Theoretical Framework and Methodology

This chapter provides a comprehensive overview of the theoretical framework employed in this research, and the rationale for use. This is purposefully described in a dedicated chapter as it relates to the third research objective, and a well-established literature gap. This chapter also describes how the methodology was chosen to reflect the theoretical framework and how this approach demonstrates ‘quality’ in qualitative research. It provides detailed context for how the methods described in Chapters 4 and 5 were chosen.

Chapter Four: Exploring Existing Practice Using Activity Theory

This chapter describes the research approaches relating to the first study objective concerning exploring existing WBA practices. The findings, analysed in terms of activity theory are presented as an activity system, and problems are represented as contradictions are discussed in terms of the literature on WBA.

Chapter Five: User Testing and Practice Observations

This chapter focuses on how interns and tutors use technology as part of WBA to make determinations about performance, relating to the second objective. Using activity theory concepts, user testing and practice observations are conducted and analysed. Findings are discussed in terms of the activity system developed in Chapter 4, and the literature reviewed in Chapter 2.

Chapter Six: Discussion, Conclusions and Implications

This chapter reviews how Chapters 3, 4 and 5 contribute towards achieving the research aim and objectives. Findings are discussed in relation to literature discussed in Chapter 2. The implications of this research, strengths and limitations, and future areas for research are discussed.

1.7 Chapter Summary

This introduction chapter provided a background to this study in terms of the literature and specific context. It articulated the aim and objectives of the research and outlined the structure of the thesis. It also provides a definition of key terms used in the thesis. In the following chapter, the description of the context for this research is described in detail, and I explain how reviewing the literature assisted in the identification of key gaps in the literature for this research to address. This chapter opened with a quote from Chris Watling, a prominent medical education researcher, highlighting the both the genuine and palpable hope of educators that CBME will be better for student learning and patient outcomes, but also how much is unknown about this approach being so widely adopted. In this thesis, I aim to explore how these hopes and unknowns are realised in the context of pharmacy and the NPIP, and specifically consider the role of innovations in technology.

Chapter 2: Context for the Study

Regrettably, these declarations appear to be more a matter of faith than of evidence.

–Norman, Norcini, and Bordage (2014)

2.1 Introduction

In this chapter, the history of the development the NPIP is described, highlighting the relevance of WBA and technology as they are of key concern to this thesis. Firstly, relevant background on the regulatory, academic, and technological landscape in which this research was conducted is provided. The main stages in the evolution of CBME and WBA in pharmacy education in Ireland (see Fig. 2.1) are described, and particular attention is given to the role of technology in line with the core focus of this thesis. Secondly, the literature on WBA practice, technology in WBA, and research approaches used in the study of WBA is critically examined. In doing so, this thesis is situated within the wider CBME and WBA literature. Finally, how the identification of gaps in the literature were used to frame the design of the aims and objectives is described. The chapter concludes with a discussion of the current issues in CBME and WBA research relevant to this chapter.

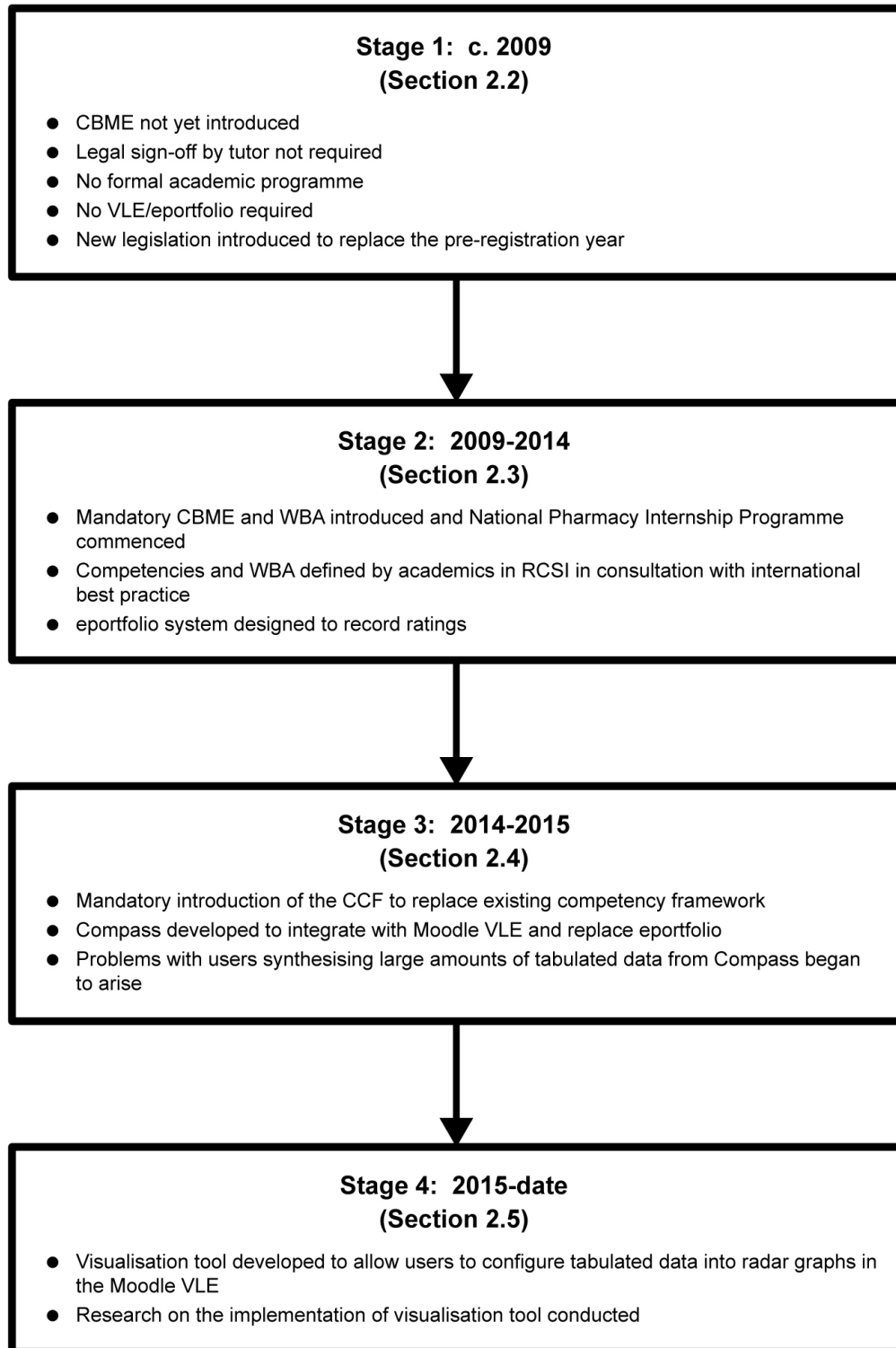


Figure 2.1. Overview of the Main Stages of CBME/WBA Development and Technology Use in the NPIP.

2.2 Main Stages of CBME, WBA and Technology Use in the National Pharmacy Internship Programme in this Thesis Context

2.2.1 Stage 1: Pharmacy Education in Ireland and the National Pharmacy Internship Programme (c. 2009)

In 2009, new regulatory requirements meant that pharmacy education in Ireland underwent fundamental reform (Strawbridge et al., 2017). The existing education and training requirements consisted of a four year honours Bachelor Degree followed by a fifth year of pre-registration training. The Pharmaceutical Society of Ireland (PSI), the pharmacy regulator in Ireland was responsible for this fifth year. It required students who had completed their Bachelor's degree to complete a 12-month period of practical training. At the end of this period, tutor pharmacists were simply required to confirm that the trainee had completed the full 12 months of training. Similar to the approach taken in many other countries at the time (e.g. Australia, New Zealand, the United Kingdom) readiness for independent practice was assessed by a multiple choice examination relating to issues of legislation and regulation.

The need to change this approach in 2009 arose from new legislation that introduced in the *Pharmacy Act 2007*. During 2008, the PSI commissioned a project entitled "The Pharmacy Education and Accreditation Reviews" (PEARs) to evaluate the existing structure (Wilson & Langley, 2010). The report arising from this project identified significant variation in trainees' experiences in their practical training, and the authors expressed concern about the overall educational quality of the process. In parallel, the PSI introduced new legislation (Pharmaceutical Society of Ireland (Education and Training Rules), 2008) that required the replacement of the pre-registration year with a programme of 12 months of in-service practical training adopting a competency-based approach, along with a formal academic component leading to the award of a Master in

Pharmacy (M.Pharm) degree. According to this legislation, completion of this programme would require assessment of the trainees' ability:

(a) to apply those parts of the designated learning and competencies relevant and appropriate to the in-service practical training programme; and

(b) albeit under the direct supervision of the tutor pharmacist, to competently pursue the profession of pharmacist.

After a tendering process, the PSI appointed the Royal College of Surgeons in Ireland to deliver this programme called the National Pharmacy Internship Programme (NPIP) on its behalf from 2009-2014. Restructuring the provision of education for pharmacy trainees (now referred to deliberately as 'interns' to highlight their role as learners under the new programme) in Ireland was a significant undertaking. The restructuring required the development of a competency framework to form the basis of the interns' activities during in-service practical training and for their assessment by their tutor. Development of a Master's level academic programme mapped to the competency framework was also required. Introduction of a formal 'professional registration examination' at the end of the year that assessed the skills developed during the year was also mandated. Strawbridge et al. (2017) provide a comprehensive overview of the development of the academic programme. In the following sections, I focus on the competency framework, WBA, and technology aspects of the NPIP.

2.2.2 Stage 2: Towards Competency-Based Education (2009-2014)

A mandatory move towards competency-based education was the most significant aspect of the change from a pedagogical perspective. At the time, use of competency-based education in the health professions was only emerging, and its use in pharmacy had been minimal. It was generally restricted to qualified pharmacists (McRobbie, Webb, Bates, Wright, & Davies, 2001), those in more specialist roles such as clinical

pharmacists in a hospital environment (Burke et al., 2008), or for future workforce needs (Neilson, Burke, & Wykes, 2003). The wider movement to competency-based medical education (CBME) had not yet gathered the momentum evident in practice today with key publications only recently published (Frank & Danoff, 2007).

Development of an appropriate competency framework was known to be critical, as it forms the core structure for all elements of a programme including WBA (Carraccio et al., 2002). Academic staff developed a competency framework for the NPIP with reference to frameworks available in 2009, piloted and refined it. It consisted of six domains, with associated competencies divided into 'clusters'. Behavioural descriptors were provided for each competency to aid interpretation (Fig. 2.2).

The PSI required interns to be formally signed off as competent by their tutor. It became a progression requirement in the NPIP, a requirement to sit the professional registration exam (PRE). This required those completing a 12-month clinical placement to complete an online workplace-based assessment (WBA) against the competency framework using a defined rating scale (discussed below) at three points in the academic year. The same structure applied for each of the three assessments; (1) interns completed a self-assessment against the competency framework, (2) tutors completed an assessment of the intern's performance based on their observations in the workplace and the intern's self-assessment which was visible, (3) the intern and tutor met to discuss ratings and plan development. For interns completing a standard 12-month placement, the first two assessments were formative (not associated with any decision on the intern's progression). At the third and final assessment, interns were either signed off as competent or not. If the tutor felt that the intern had not demonstrated competence in all relevant behaviours, a statutory process commenced to identify necessary remediation or facilitate appeal of the decision.

The rating scale used for the assessment of the workplace-based learning was based on work by the Competency Development and Evaluation Group (CoDEG, 2007). The scale, consisting of a numerical ‘level’, a single-word frequency-based ‘rating’, a descriptive ‘definition’, and a ‘percentage expression’ is shown in Table 2.1 below. In order for the intern to be signed-off, a tutor needed to rate them at ‘Level 4’ in each of the competencies in the framework as required (PSI, 2008). In the event that due to the activities in the workplace the intern could not demonstrate competence, a ‘not applicable’ rating could be given (without penalty to the intern).

Table 2.1. Overview of the CoDEG Framework used in the NPIP 2009-2014

Level	Rating	Definiton	Percentage Expression
0	Cannot	Candidate is not exposed to this standard in training establishment	n/a
1	Rarely	Very rarely meets the standard expected. No logical thought process appears to apply	0-20%
2	Sometimes	Much more haphazard than “mostly”	21-50%
3	Mostly	Implies standard practice with occasional lapses	51-84%
4	Consistently	Demonstrates the expected standard practice with very rare lapses	85-100%

The ratings were entered using an online system designed specifically for the NPIP. This technology was developed by an external company to facilitate recording of WBA information. It was Microsoft SharePoint® based and known as the ‘eportfolio’. A computer-based method was preferred to relying on paper-based records as it allowed for centralised tracking and management of the 170 intern and tutor pairs who were geographically dispersed around Ireland. It was designed to do/enable the tasks listed below:

- Prompt interns to complete their self-assessment at designated times
- Allow interns to enter their ratings (using the ‘levels’ in the rating scale outlined in Table 2.1 above)
- Record and display the entered ratings so they were visible to the intern and their designated tutor
- Notify the tutor when the intern has completed their self-assessment and prompt them to complete their assessment before a specified deadline
- Allow the tutor to enter their ratings (using the ‘levels’ in the rating scale in Table 2.1) while keeping the intern’s self-assessment visible
- Simultaneously display the intern’s and tutor’s ratings side-by-side, and aggregate these scores across the year to allow progress to be reviewed in a single place.

A screenshot of the user interface detailing the functionality is shown in Fig. 2.2

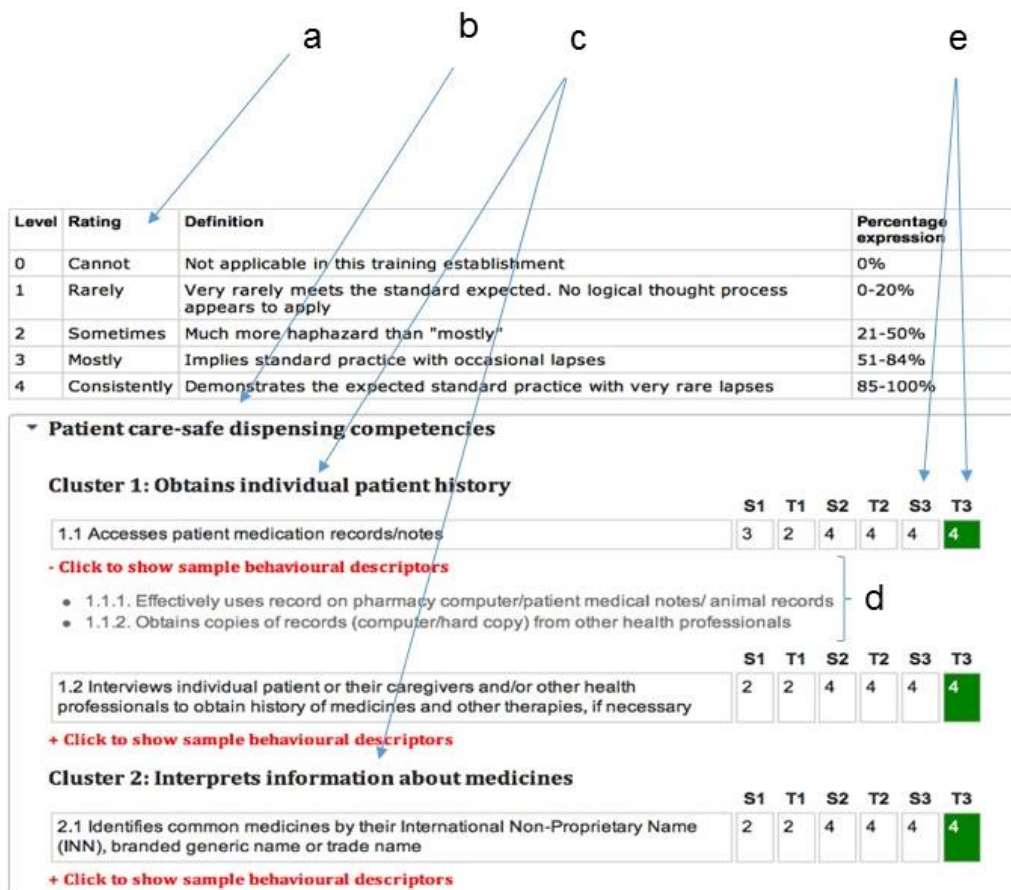


Figure 2.2. The eportfolio software used 2009-2014.

Figure 2.2 Explanation: The rating scale is visible at the top of the screen (labelled a). The patient care safe dispensing domain heading is visible (labelled b) with the first two competency clusters also shown (labelled c). The first competency ‘1.1 Access patient medication records/notes’ is shown with the relevant behavioural descriptors expanded (labelled d). This intern has completed three self-assessments (denoted as S1, S2, and S3) and the tutor has completed three assessments (denoted as T1, T2, and T3). The initial assessments saw the intern rated at levels 2 or 3, and as the intern progressed through the year, their ratings increased. In the final assessment, both the intern and tutor rated at a level 4, indicating that the intern is deemed competent (labelled e). The system highlighted the level 4s in green to enable a quick visual check by the programme administrator.

Faculty development to support tutors in this new model of education was required.

Most tutors had themselves qualified under a system where no formal trainee sign-off

was required, and therefore they had no experience of WBA or assessing trainees within a competence-based structure. An online programme consisting of 14 interactive, video-based online lectures, assessed via multiple-choice questions (MCQs) was developed under the guidance of a steering group consisting of academics, tutors, and training and development specialists. It was designed to provide tutors with relevant skills in assessment, coaching and feedback. After two years, attendance at a face-to-face ‘refresher’ training day focusing on practical skills for tutors (such as dealing with poor performance, interns in difficulty, and providing feedback) was required.

The implementation of the new programme appeared to go relatively smoothly, with 92% of interns and 88% of tutors reporting that they felt it was good preparation for future independent practice (Strawbridge et al., 2017). However, the eportfolio technology was associated with a number of problems. Issues included high cost for the department and dependency on external company technical support, resulting in significant expense and delay. It could not be linked to the Moodle virtual learning environment (VLE) and required a separate login that led to many and ongoing queries for the programme administrator. Programme evaluations by interns and tutors frequently included comments about the challenges of using the eportfolio system, although this was not a specific part of the evaluation instrument. For example:

“It gets confusing as to what is going on” (Tutor, 2010)

“The layout of the competence standards was awkward to navigate” (Intern, 2010)

Notwithstanding these issues, as there was no budget available to make improvements to the technology, the same approach was used until 2014.

2.2.3 Stage 3: National Pharmacy Internship Programme (2014-date)

In 2014, the original contract to provide the NPIP expired. RCSI again won the tendering process to provide the NPIP. While the core elements of the programme remained the same (academic programme, tutor sign-off, and professional registration exam), the PSI introduced their own competency framework ‘The Core Competency Framework for Pharmacists’ (PSI, 2013). By this time, there had been calls to move to a more global competency framework for pharmacists (Bruno, Bates, Brock, & Anderson, 2010) so the CCF was mapped from the global competency framework for pharmacists, drafted by the Pharmacy Education Taskforce, a collaboration between the International Pharmacy Federation (FIP), the World Health Organisation (WHO) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO). The PSI mandated that the CCF would replace the existing competency framework, and that the new academic programme must map to it. The CCF foreword states:

A competency framework for pharmacists was identified as a key requirement in the ongoing development of undergraduate and postgraduate education of pharmacists in Ireland, including Continuing Professional Development (CPD). This competency framework will inform the educational standards, curriculum development and learning outcomes for undergraduate students. (p. 4)

It is comprised of a hierarchical structure of six *domains*, with corresponding *competencies*. Each competency is further sub-divided into a series of *behaviours* (Fig. 2.3).

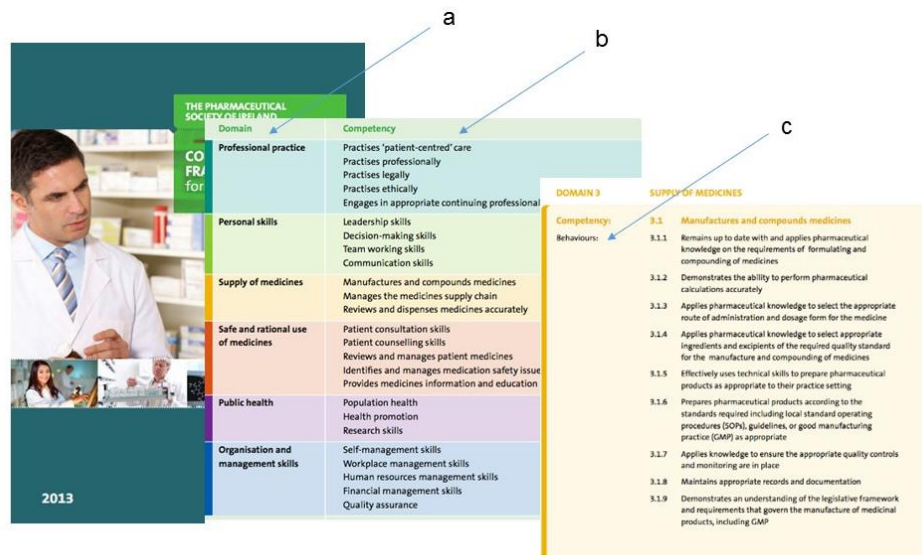


Figure 2.3. The PSI Core Competency Framework for Pharmacists.

Figure 2.3 Explanation: The framework consists of six domains (labelled a) with associated competencies (labelled b) and behaviours (labelled c). Behaviours associated with Domain 3 (Supply of Medicines), Competency 3.1 (Manufactures and Compounds Medicines) are shown. All domains, competencies and behaviours are structured in this manner in the CCF.

The CCF consisted of more elements than the previous framework (described in section 2.2.2) which was concerning. However, using it to structure WBA was mandatory according to the PSI. Its incorporation required a review the eportfolio technology that also allowed some existing technical issues to be addressed. Working with a learning technologist, I developed a system that would not require external hosting or separate login. Technology in the form of an open-source 'Moodle plug-in' called Compass (**competence assessment**) was developed to allow the same core process facilitated by the eportfolio, while integrating with the VLE and therefore allowed a single login and easier management. The rating scale was also amended slightly, with 'n/a' replacing 'Level 0', which was being interpreted incorrectly to mean that the intern had demonstrated little to no competence in the particular area.

This was replaced with ‘n/a’ to more clearly indicate lack of opportunity rather than low competence.

	1	2	3
	Start: 31 October 2014, 9:00 AM	Start: 21 January 2015, 9:00 AM	Start: 1 July 2015, 9:00 AM
	End: 10 April 2015, 11:55 PM	End: 11 May 2015, 11:55 PM	End: 31 August 2015, 11:55 PM
	S	M	S
1.1 Practises patient-centred care			
1.1.1 Demonstrates a patient-centred approach L.	3	3	3
1.1.2 Ensures patient safety and quality are at..	3	3	3
1.1.3 Educates and empowers the patient to mana..	n/a	n/a	2
1.1.4 Acts as a patient advocate to ensure that..	2	3	3
1.1.5 Monitors the medicines and other healthca..	n/a	n/a	n/a
1.1.6 Understands patients rights to receive sa..	2	3	3
1.2 Practises professionally			
1.2.1 Carries out duties as a pharmacist in a p..	3	3	3
1.2.2 Demonstrates awareness of the position of..	3	3	3
1.2.3 Treats others with sensitivity, empathy, ..	3	4	4
1.2.4 Takes responsibility for their own action..	3	3	3
1.2.5 Maintains patient confidentiality	3	4	4
1.2.6 Obtains patient consent as required	n/a	n/a	4
1.2.7 Recognises their scope of practice and th..	3	4	3
1.2.8 Maintains a consistently high standard of..	3	3	3

Figure 2.4. Screenshot of Compass.

Figure 2.4 Explanation: A screenshot of how the aggregated data is presented on Compass for an intern who has completed two appraisals. Here, competencies 1.1 and 1.2 (labelled a), which form part of Domain 1, are shown with their corresponding behaviours (labelled b). Unlike the eportfolio, the behaviours are not explained further, as they were deemed clear as written. As with the eportfolio, interns and tutors entered their ratings as prompted by the system. Previous ratings remained visible over the course of the year to see progress (labelled c). The intern ratings are recorded under the ‘S’ (student) column (labelled d), and the tutor ratings under the ‘M’ (mentor) column (labelled e). As the CCF behavioural descriptors were quite lengthy and the software was designed to function on mobile as well as desktop devices, users clicked the question mark symbol to show the full descriptor in a text box (labelled f). ‘N/a’ was used rather than ‘0’ to indicate that the intern did not have the opportunity to demonstrate competence due to lack of opportunity (labelled g).

While these changes reduced some of administrative burden, it retained many of the eportfolio design features so that users could transition to the new system without

difficulty, as there was limited opportunity for faculty development. Presentation of the data (Fig. 2.4) was similar to the eportfolio (Fig. 2.2). The CCF contained 178 behaviours that needed to be assessed by the intern and tutor at least three times per year generating 1068 individual data points per intern. My concerns over the ability of Compass to help interns and tutors complete the extensive WBA requirements were compounded when reviewing free-text comments in the evaluation.

“It can be quite monotonous completing the self-appraisal and difficult to maintain enthusiasm when completing in” (Intern, 2015)

“Compass appraisal is very large; difficult for both parties to discuss” (Intern, 2015)

“Better training on the use of online compass needed” (Tutor, 2015)

The free-text comments also indicated that Compass was sometimes not being used as intended as part of the WBA process.

“My tutor has not formally discussed my appraisal-just made a couple of remarks” (Intern, 2015)

“Getting time to discuss the appraisal with the tutor is difficult” (Intern, 2015)

“I didn’t have an opportunity to discuss appraisals with tutor” (Intern, 2015)

2.2.4 Stage 4: The Compass Visualisation Tool Development (2015)

Based on this feedback it was evident that while Compass addressed administrative difficulties, new problems arose. Although Compass was very similar in functionality to the eportfolio, the increased number of elements to be assessed appeared to impact on users. When considering how to address this issue, I identified that one possible approach involved enhancing Compass functionality to allow users to configure the rating data in a visual manner using graphs, may help them better interpret and use the large quantity of data produced. A Visualisation Tool designed to work with Compass

was developed. It was planned to be ready for implementation in January 2016 (in time for the intern's second WBA in the 2015/2016 intake).

It was concluded that a visualisation approach using 'radar graphs' could best meet the requirements of this data. Users would input their ratings in the same manner as before, with an option to reconfigure this data also available. Radar graphs (also known as spider graphs, star plots, web charts, cobweb charts, polar charts, or Kiviat diagrams) display multivariate data in a single graph. They allow three or more quantitative variables to be represented on equiangular spokes that all start from the same point (the spokes are known as radii). The radii length have maximum and minimum points and/or intervals to plot the data. They are particularly useful for assessing the symmetry of quantitative data rather than comparing their magnitudes (Goldberg & Helfman, 2011, p. 4). When plotted on the graph, data points on each spoke are connected giving the appearance of a spider web or star (Fig. 2.5). Radar graphs can be used to show data from individuals, multiple individuals or groups and changes over time (Saary, 2008).

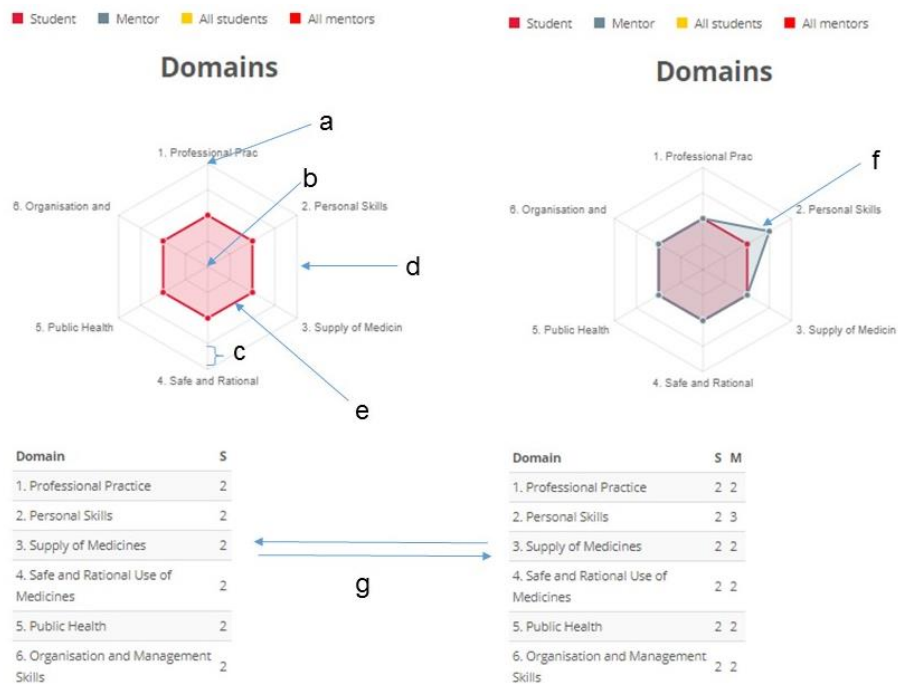


Figure 2.5. Radar graphs produced by the Compass Visualisation Tool.

Figure 2.5 Explanation: Two radar graph structures are shown. There are six variables labelled on the graph (Domain 1 is labelled a). The radii shown represent the rating scale with n/a the central point (labelled b) and the units on the radii (labelled c) representing Levels 1-4. The outer point on the radii (labelled d) represents Level 4. The intern's average self-assessment rating for each domain is shown as red dots, and these dots are connected to form the web appearance (labelled e). In the chart on the right, the mentor's (tutor's) ratings are shown on the same radar graph coloured grey. A key strength of the radar graph is being able to display two or more sets of data simultaneously to allow comparisons. Here, it is visible that for Domain 2, the mentor's rating is higher than the intern's self-assessment rating (labelled f). In both charts, the data are summarised in a table below the radar graph (labelled g) for reference by the interns and tutors to aid comprehension, as due to the lengthy names of the domains they cannot fully fit on the chart.

As well as showing the domains of the CCF (as in Fig. 2.5), the radar graph-based design of the Visualisation Tool could show the competencies and behaviours in a manner that reflected the overall hierarchy of the CCF and accommodate the variability. The CCF contains six domains, each with a varying number of

competencies. Domains 3 and 5 have three competencies, Domain 2 has four competencies, and Domains 1, 4, and 6 have five competencies. Similarly, the number of behaviours associated with each competency varies from four to 16. Radar graphs could facilitate this variability. Reducing the quantity of data presented at once was achieved by designing the Visualisation Tool to generate *interactive* radar graphs. Users could control the quantity of information displayed by clicking on different areas on the graph (see Fig. 2.6). For example, if a user clicked on the interactive point on the radar graph showing the score relating to Domain 1, the next radar graph in the hierarchy (competencies) appears. Tables summarising the data were also visible below to assist users who wanted to see the full descriptors.

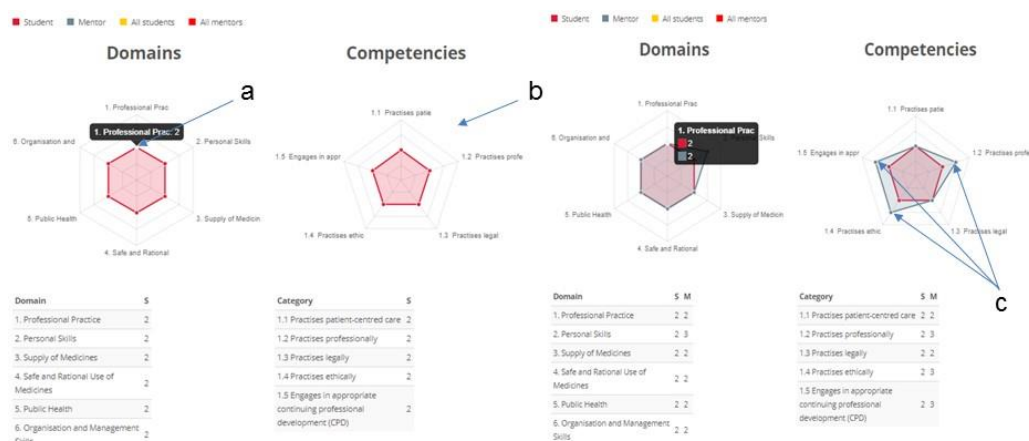


Figure 2.6. Visualisation Tool Interactive Graphs.

Figure 2.6 Explanation: Domain 1 has five competencies which can be accommodated on the graph. When users click on the interactive point on the graph relating to Domain 1 (labelled a), it configures a second radar graph (labelled b) that shows the competencies for Domain 1. The intern's average self-assessment rating is shown on the two graphs to the left, and the intern and mentor's (tutor's) average ratings are shown in the two graphs on the right. There are three competencies (1.2, 1.4, and 1.5, labelled c) where the tutor feels that the intern has demonstrated competence at level 3, i.e. they have rated the intern more highly than the intern has rated themselves.

Users could similarly click on each competency to show third graph displaying the behaviours relating to the competency and domain previously selected (Fig. 2.7).

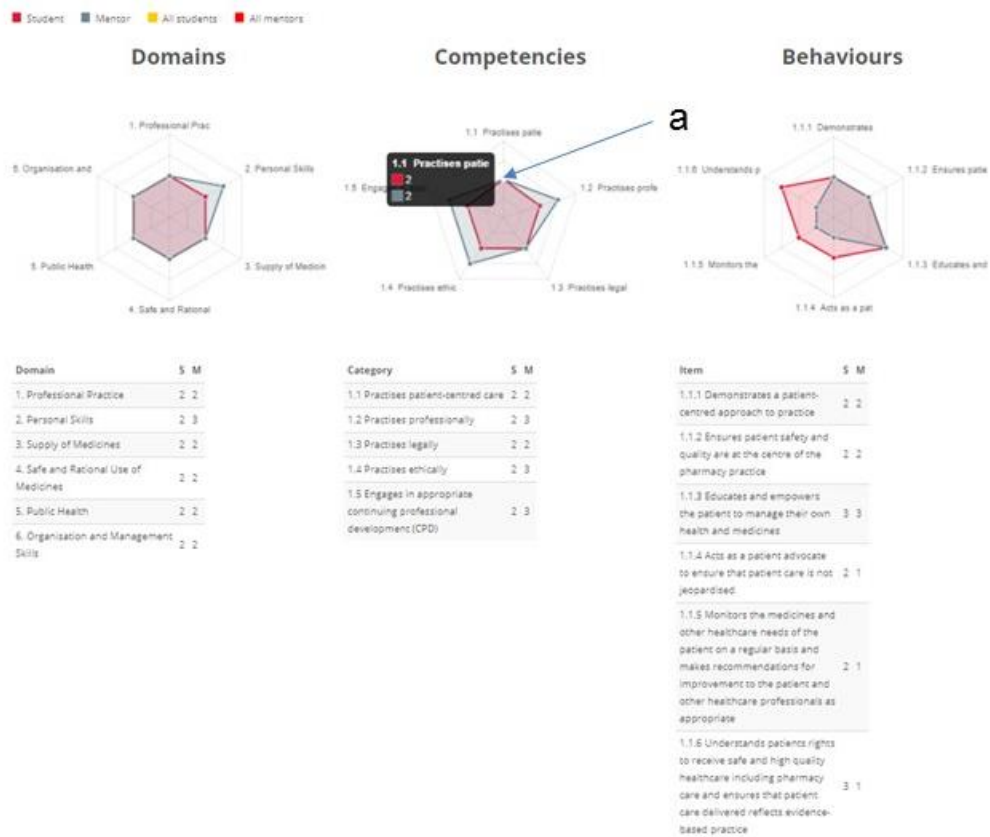


Figure 2.7. Viewing Related Domains, Competencies and Behaviours.

Figure 2.7 Explanation: When users click on a particular competency – in this case, competency 1.1 (labelled a) on the radar graph in the centre they bring up a third graph representing the behaviours relating to the competency selected. The ratings for the behaviours relating to the competency selected by both the intern (red) and mentor/tutor (grey) are shown. The graph on the right shows that while the overall average rating of competency 1.1 by the intern and tutor was at level 2, there are individual differences that may need to be considered by the intern and tutor during their progress discussion. While these differences are visible, this is done in a manner that aims to preserve the perspective that overall, the tutor and intern feel similarly.

While the interactive nature of the design was helpful in allowing users to have control over the data presented on the screen at any one time, Compass allowed the comparison of progress over time (Fig. 2.2). This functionality also needed to be supported by the new Visualisation Tool. A number of features were added to support *review of development over time*. Interns and tutors are required to complete a minimum of three assessments per year, so the Visualisation Tool was designed to allow users to select to view one assessment (e.g. view the first one only) or all completed assessments (called phases). If users selected 'all phases' and two or more assessments had been completed, shading within the radar graph was used to indicate development over time (shown in Fig. 2.8). Users could also select to view data in a number of combinations by clicking various check boxes. Options included student only, mentor only, student and mentor, student and all users, mentor and all users (the 'all users' feature is discussed below).

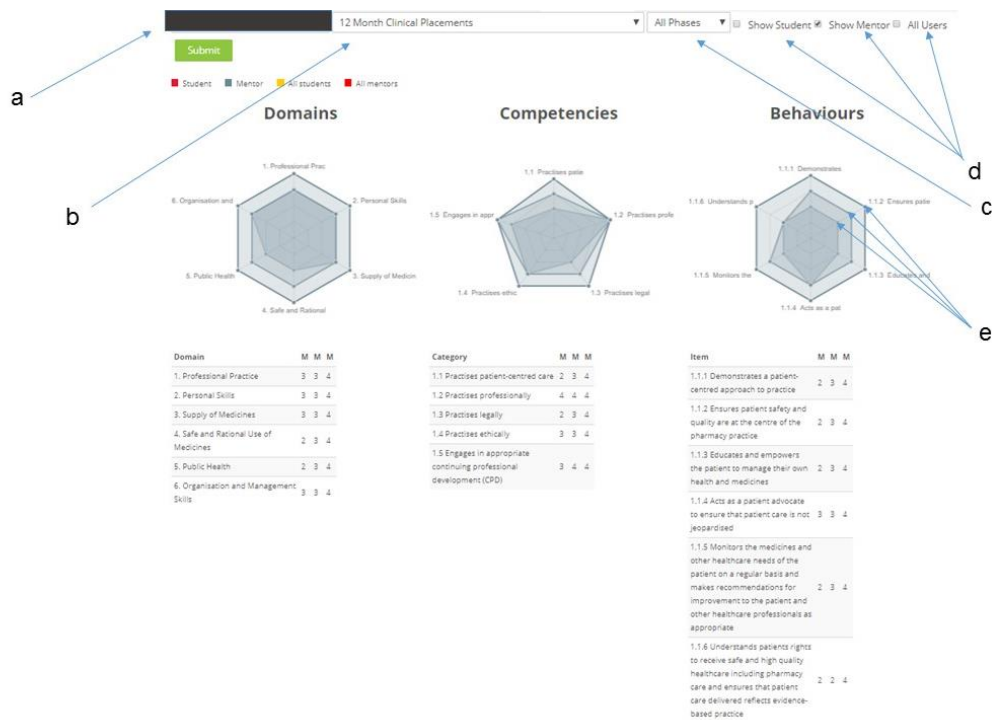


Figure 2.8. Visualisation of Intern Development Over Time.

Figure 2.8 Explanation: The intern's name is shown (labelled a). The placement type is shown (labelled b). In order to allow all users to assess progress over time, the plugin contains a number of options that can be selected by users to control how the data are presented. Users can opt to view all completed appraisals on the one radar graph, or else to use the phase dropdown menu (labelled c) to select one to view. In this case, 'all phases' is selected, and the intern has completed three appraisals, so three are shown simultaneously on the graph. These users also have the option (labelled d) to select to view two of the following on the same graph: student (intern), mentor (tutor), all users. In this case, 'show mentor' is selected, so the data visible on the graph represent the tutor's scores across the three appraisals. Shading is used to indicate development over time (labelled e). The ratings by the mentor for behaviour 1.1.2 increased from level 2 in the first assessment to level 3 in the second, and finally level 4 in the third and final appraisal. On the radar graph this is indicated by shading, and the area shaded darkest represents the first tutor rating, the slightly lighter represent the second, and the lightest represents the third. The data are also summarised in the table below each graph for reference.

The final feature of the Visualisation Tool (mentioned briefly above) was the ability to compare the ratings for a particular intern against all other interns, or the ratings

provided by a mentor against those provided by all mentors (Fig. 2.9). This was intended to provide context for interns and tutors who wished to review progress in terms of the overall cohort in a similar placement type.

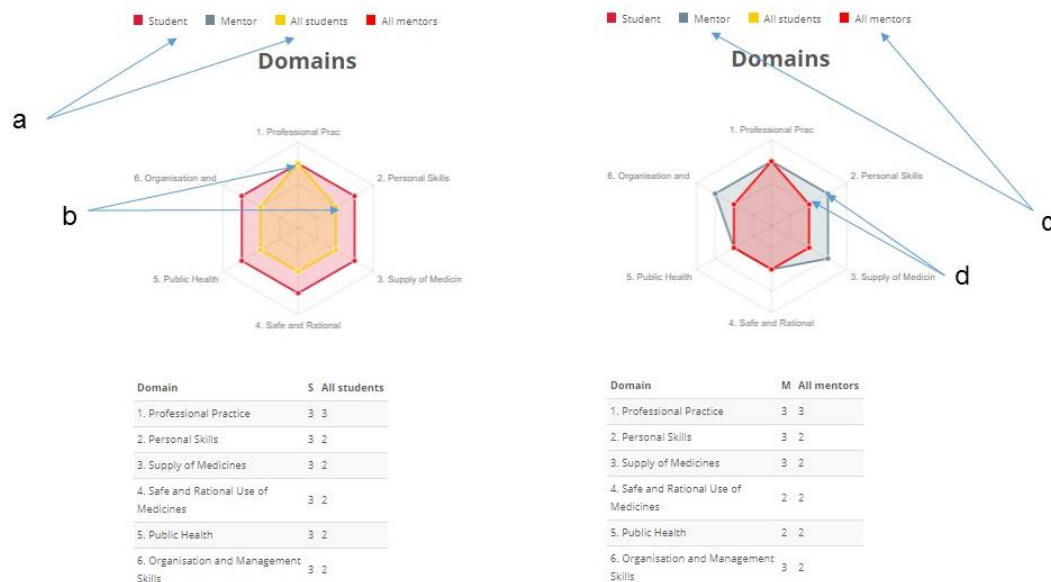


Figure 2.9. Comparing Individual Intern to the Overall Cohort.

Figure 2.9 Explanation: The software allowed comparisons to be made against the overall cohort. Using the same student data as Figure 2.8, a comparison was graphed for phase one data at the domain level only using the intern and mentor data. In the graph on the left, colour coding key (labelled a) explains that the intern (student's) own self-assessment rating is in red, and the average self-assessment ratings of all students in the cohort in yellow. The domain-level scores are shown (labelled b), and it is possible to obtain the competency and behaviour comparisons by clicking on the graph as per the previous examples. In the graph on the left we can see that the student (intern), on average, rates themselves at level 2 for Domain 1 (the same as the average of their cohort), but averages a level 3 in Domain (higher than the average of their cohort). In the graph on the right (labelled c), the mentor (tutor)'s ratings (in grey) are graphed with the average of the mentors (tutors) in the cohort (in orange). Difference between the mentor's rating and the average mentor ratings are evident e.g. in Domain 2 the mentor's rating at level 3 is higher than the average at level 2 (labelled d). In all cases, the data are also available in the table below the graphs, and the domains can be expanded to competencies and then behaviours as per the previous examples.

Aside from the core functionality, the Visualisation Tool was designed so that its administrative maintenance was minimal and that anyone with a basic level of knowledge of the Moodle VLE could provide administrative support to avoid reliance on costly IT support. Setting up Compass for a cohort of interns (including Visualisation Tool) can be completed in five straightforward steps (Fig. 2.10). The programme coordinator could easily adjust assessment dates and user accounts if the need arose from within our existing Moodle system.

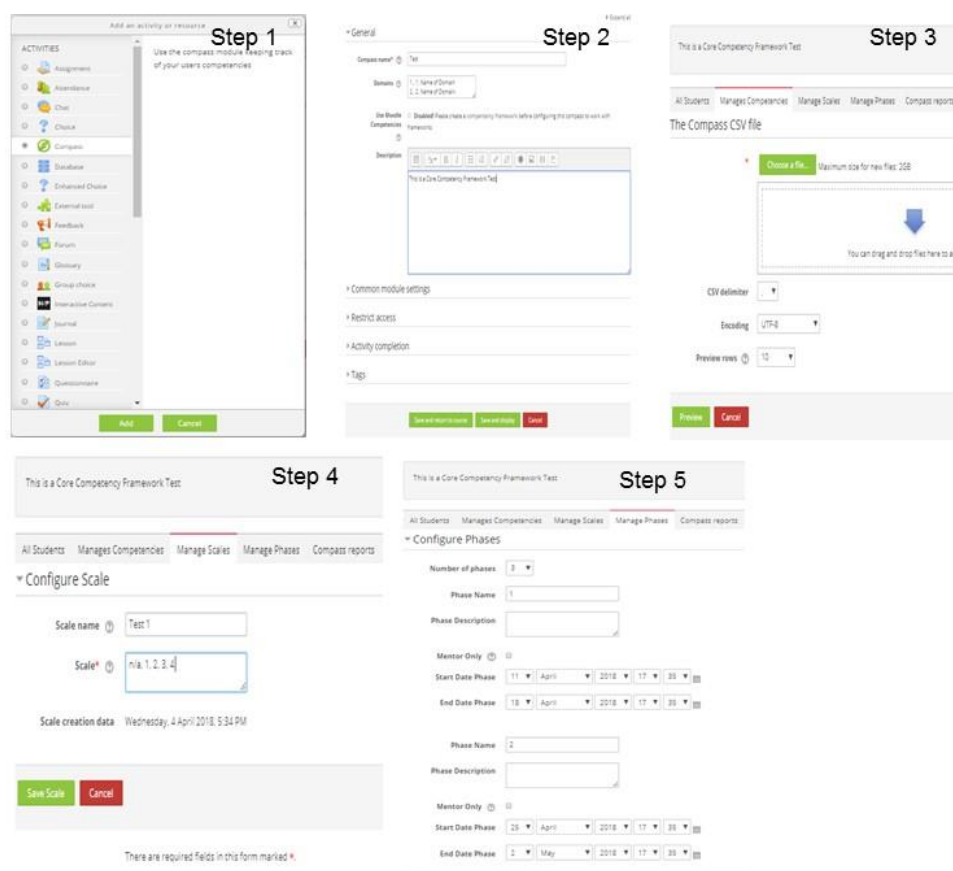


Figure 2.10. Setting up a Compass Moodle Instance

Figure 2.10 Explanation: First, the user in editing mode clicks the option to add an activity or resource and selects Compass from the list (Step 1). Next, the user gives the instance a name, inputs the domain as per the instruction and adds a description (Step 2). The user then uploads a competency framework that has been entered into a csv file (Step 3). Next, the user enters the desired scale name, and scale units separated by commas (Step 4). Finally, the user selects the number of phases and dates for the assessments (Step 5).

Two recent graduates and two previous interns who were based in the School of Pharmacy tested the Visualisation Tool. They reported finding it straightforward to use, and as there was limited time (and budget) available to make amendments to the design, it was considered ready for implementation in October 2015. As this was past the time of the first (phase 1) assessment for some interns, implementation was deferred until January 2016 when all interns would attend RCSI for training and the Visualisation Tool could be introduced to them.

2.3 Researching the Visualisation Tool

During the process of developing the Visualisation Tool, I became interested in how this innovation might fit in terms of both the WBA and technology-enhanced learning (TEL) fields of research. After a focused literature search, I recognised that there was very limited literature on technology in WBA, and that the Visualisation Tool had the potential to form the basis for an interesting and important study with relevance to many CBME/WBA researchers and practitioners. I also recognised that I would have a unique opportunity to research its implementation and use in practice within the same cohort of interns and tutors. I identified my research interest was exploring the potential of the Visualisation Tool to affect WBA practice. I framed this as the following research aim:

To explore how the introduction of a novel Visualisation Tool affects the workplace-based assessment practices of pharmacy interns and tutors in Ireland.

2.4 The NPIP, CBME and the Principles of WBA

Before I began to think about how to design a research study to achieve this aim, I considered how the aim I had identified related to other research on the topic. I therefore sought to explore how the WBA approach I would be researching reflected

contemporary practice in other settings. Identifying the relevant literature from key researchers in CBME/WBA was the starting point for this search. By 2015, CBME and WBA had begun to become more prominent in the core medical education journals (Frank et al., 2017). The establishment of the International Competency-Based Medical Education (ICBME) Collaborators, who describe themselves as ‘leading international experts who examine conceptual issues and current debates in competency-based medical education’, was an important milestone for CBME research. In August 2010, the group published a landmark special issue in the prominent journal *Medical Teacher* devoted to CBME. This special issue aimed to demonstrate that ‘despite criticism and challenges to implementation, CBME is an attractive direction for health professions education’ (Snell & Frank, 2010, p. 630).

The issue addressed diverse topics including definitions of CBME from technical (Frank, Mungroo, et al., 2010) and operational perspectives (ten Cate, Snell, & Carraccio, 2010), and the origins and development of CBME (Frank, Snell, et al., 2010). It explored issues of implementation for undergraduate (Harris, Snell, Talbot, & Harden, 2010), postgraduate (Iobst et al., 2010) and continuing medical education (Campbell et al., 2010) programmes as well as assessment (Holmboe et al., 2010). The issue concluded with contributions on issues of CBME and policy (Taber et al., 2010), and faculty development (Dath, Iobst et al., 2010). None of these papers contained empirical data. All except one (a systematic review of definitions by Frank et al. (2010)) were commentaries or opinion pieces. There was very limited reference to technology evident in these papers.

2.4.1 The NPIP and Assessment in CBME: Potential Strengths and Limitations

As this thesis is focused on a WBA, the most relevant publication from the special issue described in section 2.7 related to issues of assessment in CBME. In their overview, Holmboe et al. (2010) highlighted six key components of an effective assessment system in CBME. In Table 2.2, these components are listed alongside a summary of key points raised in other relevant literature. In section 2.4.2 below, I go on to critically evaluate the approach used in NPIP (steps described in Section 2.3) in terms of the wider WBA literature.

Table 2.2. Summary of Best Practice Features in CBME Assessment

Components from Holmboe et al. (2010)	Key Points/References
1. Assessment should be continuous and frequent	Formative assessment should be emphasised over summative (van der Vleuten, Schuwirth, Scheele, Driessen, & Hodges, 2010); sample size should be large (Lurie, 2012, p. 54); feedback and practice are important (Ericsson, 2004); time alone is not a good determinant of progress (ten Cate, 2015); self-assessment alone may be problematic (Eva & Regehr, 2007, 2008; Altahawi, Sisk, Poloskey, Hicks, & Dannefer, 2012).
2. Assessment must be criterion-based, using a developmental perspective	Language may cause confusion (Lurie, 2012, p. 51; Lurie, Mooney, & Lyness, 2011); criteria tend to be individualistic rather than collaborative (Lingard, 2009); scales should match development (Humphrey, Marcangelo, Rodriguez, & Spitz, 2013) and be simple (Byrne, Tweed, & Halligan, 2014); entrustable professional activities may help link competencies (abilities), milestones, and professional activities (Carraccio & Burke, 2010; ten Cate, 2014; ten Cate & Scheele, 2007); atomisation of criteria should be avoided as it reduces validity (van der Vleuten & Schuwirth, 2005).
3. CBME, requires robust work-based assessment	Direct observation is deemed critical (Govaerts, van der Vleuten, Schuwirth, & Muijtjens, 2007; Holmboe, 2015); assessors' own perceptions important (Ginsburg, McIlroy, Oulanova, Eva, & Regehr, 2010); tendency to focus on what can be measured (van der Vleuten & Schuwirth, 2005, p. 311; Hodges, 2006); 'construct-aligned' scales improves assessment reliability (Crossley et al., 2011; Ginsburg, 2011); standardised tools e.g. the 'mini clinical evaluation exercise (mini-CEX)' may be useful (Norcini, Blank, Duffy, & Fortna, 2003).
4. Training programs must use assessment tools that meet minimum standards of quality	Competency frameworks that are composed of multiple hierarchical levels may have limited practical value (Lurie, 2012, p. 46; ten Cate et al., 2010, p. 671); competencies can be difficult to unless they relate to daily practice (Jones Jr, Rosenberg, Gilhooly, & Carraccio, 2011); traditional measures of utility need to be reconsidered (van der Vleuten & Schuwirth, 2005, p. 313; Hawkins et al., 2015); available assessment tools are often used inappropriately by assessors (Green & Holmboe, 2010; Lurie, Mooney, & Lyness, 2009; Byrne et al., 2014); expert judgement should be valued (Ginsburg et al., 2010).
5. More 'qualitative' approaches to assessment should be used	CBME approaches risk oversimplifying practice (Morcke et al., 2013); narrative synthesis should carry a lot of weight (van der Vleuten et al., 2010); subjective' tools can be reliable (van der Vleuten & Schuwirth, 2005); faculty and trainee decision making process is complex (Ginsburg, Lingard, Regehr, & Underwood, 2008; Ginsburg, Regehr, & Mylopoulos, 2009); ratings also link to the quality of care received by patients during the process (Kogan, Conforti, Iobst, & Holmboe, 2014).
6. Assessment needs to draw upon the wisdom of a group and involve active engagement by the trainee	Checklist-based approaches may be falsely considered more objective than rating scales (Norman, 2006) (van der Vleuten & Schuwirth, 2005); experienced and non-experienced raters process information (Govaerts, Schuwirth, van der Vleuten, & Muijtjens, 2011; Govaerts, van de Wiel, Schuwirth, van der Vleuten, & Muijtjens, 2013); free-text comments recorded are useful for context (Ginsburg, Gold, Cavalcanti, Kurabi, & McDonald-Blumer, 2011); assessors may rate differently depending on the context (Ginsburg, Regehr, & Lingard, 2004; Regehr et al., 2012); global ratings are variable due to assessor rather than trainee factors (Williams, Dunnington, Mellinger, & Klamen, 2015); Clinical faculty may be overburdened with issues such as bureaucracy if the requirements are too onerous (Malone & Supri, 2012).

2.4.2 Mapping Steps of NPIP WBA to other Published Research

The mapping exercise above helped me identify that the NPIP approach to WBA has strengths and limitations, and the Visualisation Tool had the potential to address some but not all of them. This review also highlighted that technology in WBA formed part of a wider complex system, and it was important to understand this wider system before focussing narrowly on technology. Therefore, I initially adopted a broader focus and considered what literature I had found firstly in relation to the particular steps of the NPIP WBA.

2.4.2.1 *The Competency Framework*

In the case of the NPIP, adopting the CCF for the WBA was a regulatory requirement, which represented both a potential strength and limitation. Regulator or otherwise consensus-based frameworks can help avoid the unnecessary design of numerous local versions according to Holmboe et al. (2010), and reduce unwanted heterogeneity (Hawkins et al., 2015). However, in their scoping review, Delany et al. (2016) highlight that adopting externally determined frameworks may prove challenging to translate frameworks into practical learning strategies. Similarly, this is raised by Lurie et al. (2011, p. 49) in his critique of CBME where he suggests that where “models of competency are legislated rather than shaped by scholarly consideration of empirical data, it is unlikely that such models reflect actual human behaviour”. He is further concerned that this leads to the false assumption that these are ‘objective’ rather than “socially constructed ideas” (2012, p. 52). His worry is based on the fact that such frameworks will have limited practical value if competencies are not “naturally occurring regularities in people’ actual behaviours” leading to “little hope they will ever be measured in a reliable way” (2012, p. 52). This concern is also raised

by Lingard (2009) who highlights the risk of failing to think critically about the competence discourse and to remember that the idea of competence is “constructed”. In recognition of these concerns, by 2015 the move to reconfigure competencies (which describe attributes of trainees) into units of observable work known as entrustable professional activities (EPAs) had begun in other programmes (Caverzagie, Cooney, Hemmer, & Berkowitz, 2015; ten Cate et al., 2015a). Adopting this approach helps overcome the issues listed above (ten Cate & Scheele, 2007), but was not possible for NPIP at the time of this research. Therefore, the likelihood of issues arising from the framework used in practice appeared relevant in this case, as use of the lengthy CCF which was developed using a consensus approach based on international frameworks and extensive stakeholder feedback was mandatory.

Feedback from interns and tutors appeared to suggest that some framework-related issues were arising. For example, there were comments relating to concern at the length of the framework. The CCF is a very extensive document, and the language used is regulator-orientated. Having such a fragmented list of competencies and behaviours, risks the reduction of validity and fail to assess the intern as a whole (van der Vleuten & Schuwirth, 2005). Inclusion of the ‘n/a’ option in the rating scale (and its use by interns and tutors) indicates that some elements of the CCF have limited practical value.

2.4.2.2 *The Rating Scale*

Rating scales are one of the most researched topics in WBA. Rating scales contain anchors that may reflect performance (e.g. unsatisfactory), frequency of behaviour (e.g. rarely), normative behaviour (e.g. performed at the level expected of an intern), entrustment/supervision levels (e.g. the intern should observe only), or narrative

descriptions (Crossley et al., 2011). Assessors make judgements about trainee performance use rating scales; therefore, it is important that assessors interpret the scale correctly and assign the appropriate score that reflects performance. When rating scales are unclear (e.g. due to terminology used, if they have several variables etc.) reliability (reproducibility of scores) is compromised, and may lead to an unintended decision about trainees' development (van der Vleuten & Schuwirth, 2005). Even if a rating scale seems to be clear in terms of meaning, it has been established that assessor variability can still occur. This is most commonly due to self-reference, where assessors relate 'good' behaviour to their own usual performance rather than the criteria (Ginsburg et al., 2010; Govaerts et al., 2007; Govaerts et al., 2011; Kogan et al., 2014). Crossley et al. (2011) demonstrated that the best way to increase reliability is to use 'construct-aligned' rating scales, where descriptors matches closely to what is being assessed. A good example of a construct-aligned scale is where the ratings relate to the level of trust the supervisor has in the trainee to complete a task competently. For example, the scale could say for a particular task e.g. taking a medication history that a trainee was 'Level 1 – could be present and observe somebody taking a medication history' while another trainee could be 'Level 5 – Provide supervision to junior trainees' (ten Cate et al., 2015a, p. 992)

The rating scale used for the NPIP WBA appears likely to have properties that would render it challenging to use in practice. It has 20 variables, which is likely to affect users' cognitive load (Byrne et al., 2014). It also is not construct-aligned. It contains descriptors, which although intended to aid comprehension, do not describe exactly what behaviour should be observed. Using ratings based on frequency of behaviour would seem intuitively difficult use over intervals of 3-4 months for 178 behaviours.

Rating scale use forms an element of criterion-based assessment (No. 2, Table 2.2) and also using tools that meet minimum standards of quality (No. 4, Table 2.2). The approach used in the NPIP does not require interns to reach target scores at particular stages during the year, and utility has not been evaluated. However, as there was no evidence of interns or tutors reporting challenges with the scale, it is unclear whether the concern is of practical or purely theoretical relevance. I therefore considered that it would be important to understand this through empirical study.

2.4.2.3 *The Workplace*

The intern and tutor are required to work alongside each other for a minimum of three of the intern's five working days per week as part of their training. Working together in this environment is considered an essential component of WBA (No. 3, Table 2.2) for ensuring an emphasis on assessment of what trainees will ultimately do and facilitate provision of robust feedback. It helps the tutor ensure they have enough information to make judgements about the intern's ongoing competence to distinguish 'signals from noise' (Lurie, 2012, p. 54). Work-based assessment is considered to be inherently valid, as the tutor can observe the intern's habitual behaviour ('does') in an authentic setting that allows the tutor to make well-informed judgements about the intern's performance (Kogan & Holmboe, 2013; van der Vleuten & Schuwirth, 2005). In the medical field, there are concerns raised about the assessment of trainees based on short rotations, and the fact that assessors may have varying exposure to trainees from which to make their judgement (Williams et al., 2015). In the NPIP, short duration or limited exposure of the intern to the tutor are not relevant. For the NPIP, it is quite the opposite, where it is concerning that only one person will assess the intern's progress, as multiple assessors are favoured (Holmboe et al., 2010), especially with summative decisions (Swing, Clyman, Holmboe, & Williams, 2009). Margolis et

al. (2006) found that one assessor completing a particular WBA multiple times is associated with lower reliability compared with multiple assessors completing one assessment in an empirical study. Therefore, the NPIP approach to have strengths relating to the close working relationship of interns and tutors (No. 3, Table 2.2), but limitations in terms of having only a single assessor (No. 6, Table 2.2). The impact of these potential strengths and limitations in practice was unclear, and this required further empirical investigation.

2.4.2.4 *Intern Self-Assessment*

NPIP interns first complete a self-assessment against the CCF behaviours using the rating scale. Self-assessment is a process where interns interpret data about their own performance and compare it to a standard (in this case the CCF using the rating scale) (Epstein, Siegel, & Silberman, 2008). It is generally considered useful for trainees but it is generally cautioned that it should be combined with other assessments as it has been shown to be ineffective in isolation (Eva & Regehr, 2007, 2008). Sargeant et al. (2010) conducted a large empirical qualitative study and concluded that the challenge of self-assessment lies in its complexity rather than ineffectiveness. Holmboe et al. (2010) state that self-assessment is considered an important element of learning, to guide trainee development, promote deliberate practice to develop expertise and support professional development (No. 1, Table 2.2). Therefore, the inclusion of self- and tutor approach to assessment appears to be a strength of the NPIP approach to WBA. Again, from the available information it is not possible to say with certainty how this is realised in practice in the NPIP.

2.4.2.5 *Assessment of Intern by Tutor*

CBME assessment places increased responsibility on clinical faculty (in this case tutors) and adequately preparing them is an important part of ensuring robust WBA (No. 3, Table 2.2). Evidence from the CBME literature suggests that faculty are generally insufficiently prepared for their assessing role (Holmboe et al., 2011). Training assessors is important to ensure accurate and reproducible ratings and that therefore WBA of trainees is fair (Pelgrim et al., 2011). In WBA, the potential for variability in ratings due to the assessor rather than the trainee is high due to the inherent challenges of competence assessment. Such challenges include individual assessor factors (Williams et al., 2015), and context factors (Ginsburg et al., 2004). It is important not to underestimate the complexity of this process for most WBAs.

Kogan, Conforti, Bernabeo, Iobst, and Holmboe (2015) completed a qualitative study of participants' experience of training. Their findings suggest that training can improve assessors' approaches to observation and feedback although assessors reported changing their behaviour in practice challenging. According to Gingerich, Kogan, Yeates, Govaerts, and Holmboe (2014) assessors should be considered trainable, fallible, and sometimes meaningfully idiosyncratic. This means that training should be considered as only one element of faculty development efforts, not the answer to all potential problems. NPIP faculty development is modelled on performance-dimension training (designed to increase knowledge of the framework and scales), and frame of reference training (designed to show examples relating to different levels of behavioural performance to improve rater reliability) (Preusche, Schmidts, & Wagner-Menghin, 2012, p. 371). While this kind of training is considered good practice, it is not clear if it translates to good tutor assessment

practice in WBA. As faculty development is only required once every two years, it is not clear if how training affects the tutors' practice in NPIP, or if the theoretical challenges present practical problems.

2.4.2.6 *Discussion of Ratings at Review Meeting*

While the interns and tutors both use the same checklist and rating scale, it is likely that they interpret them differently due to differing levels of expertise (Govaerts et al., 2011). Ambiguity in practices can lead to differences in interpreting performance levels, so a formal discussion should help to clarify any disagreements in ratings (Ginsburg et al., 2009). Once discrepancies have been discussed, the meeting provides a formal opportunity for the intern to receive feedback on their development. The meeting should facilitate the provision of feedback which is important for WBA (van der Vleuten et al., 2010). It also allows for clarification where the intern is unsure how the competencies relate to daily practice, another potential problem with WBA (Jones Jr et al., 2011). Compass does not require narrative comments to be recorded by tutors, but it is known that these comments are often very useful to trainees (Ginsburg et al., 2011). Incorporating "qualitative" approaches to assessment is important for WBA (No. 5, Table 2.2). As no formal record of the meetings is required, it is unclear if they meet the potential to facilitate development discussed above. The intern comments provided in the evaluation appear to suggest that these meetings are not always completed, but it is not clear how this occurs in practice.

2.4.2.7 *Balance of Formative and Summative Assessment*

The inclusion of formal formative assessments is a strength of the NPIP approach to WBA. Whether this meets the criteria of 'continuous and frequent' (No. 1. Table 2.2) is somewhat less clear (Holmboe et al., 2010). While this approach seemed

appropriate from the perspective of being developmental and facilitating progress over time, it did not reflect the emerging approaches, such as the use of ‘milestones’ (which requires learners to meet target levels of competence at defined points in the year) considered to facilitate development (Carraccio & Burke, 2010; ten Cate et al., 2015a). The assumption with formative assessment is that it facilitates the collection of feedback (Pelgrim et al., 2011, p. 140) and encourages deliberate practice by the learner (Ericsson, 2004). However, this represents an increased workload for clinical faculty who may or may not have the capacity to meet trainee requests, or deal with the bureaucracy associated with recording assessments (Malone & Supri, 2012). It is likely that verbal feedback provided during the meetings may not be formally recorded (Barrett, Galvin, Steinert, Scherpbier, O’Shaughnessy, Walsh, et al., 2016). Feedback from the NPIP evaluations discussed above indicates that perhaps feasibility is lower in this case, due to the long list of behaviours that must be assessed. It is not clear how the meetings to discuss feedback after both intern and tutor have completed their ratings proceed, with some feedback comments suggesting that in some cases it does not always happen.

2.4.2.8 *The Role of Technology*

The role of technology in the approach to WBA in the NPIP is important, and feedback from our interns and tutors about technology had prompted the development of the Visualisation Tool. It is interesting to note that technology does not feature prominently as either a strength or a challenge of WBA, and its role appears to be considered to be administrative in nature. Holmboe et al. (2010, p. 677) suggest that information technology is a ‘microsystem success characteristic’ and that an assessment system requires a ‘portfolio, preferably electronic’ to be successfully implemented. Technologies such as handheld devices or voice recorders have been

identified as a strategy for enhancing quality of feedback and should be researched to evaluate this and potential associated assessor workload reduction (Bok et al., 2013, p. 8). Ferenchick and Solomon (2013) conducted a feasibility study with a “web based content management system” designed to overcome barriers to direct observation and assessment, which reported high levels of user satisfaction with their system. While the majority of references to technology are in this manner, it is clear that in some of the empirical studies available, technology was developed as part of WBA study. For example, Chan and Sherbino (2015) describe the design and development of a sophisticated WBA tool for local use in McMaster University, Canada. It is evident that new technology was developed to deliver the assessments, but its development or role in WBA practice are not described. Other studies, focused specifically on the technology only, but did not explore how use formed part of overall practice. Coulby, Hennessey, Davies, and Fuller (2011) specifically provided a group of 14 final year medical students with personal digital assistants (PDAs) and evaluated their experience of using them for WBA. Their findings conflate the benefits of WBA with the benefits of the technology but suggest that although not welcomed by all clinicians, some students found it helpful when initiating engagement. The technology encouraged provision of immediate feedback and the authors report their findings as a proof of concept for mobile devices in WBA. Briceland and Hamilton (2010) evaluated the use of an eportfolio in pharmacy education to demonstrate achievement of ability-based outcomes, although there is limited detail on the methodology employed or the particular impact of role of the technology. With the majority of studies referring indirectly to the role of technology in WBA, it was not possible for me to establish clearly how our use of technology fits within wider practice.

2.4.3 WBA Tools and the NPIP

Having evaluated how the NPIP WBA principles broadly related to principles of ‘good’ assessment, the approach to assessment used was considered in more detail. With WBA, the assessment usually takes place in real time, with the supervisor observing the trainee in a specific aspect of clinical practice using defined tools (Barrett, Galvin, Steinert, Scherpbier, O’Shaughnessy, Walsh, et al., 2016). The CBME literature describes a number of tools that may be used (sometimes in combination), although evaluation of their impact on education and performance is rare (Miller & Archer, 2010). In their systematic review, Kogan et al. (2009) identify 55 tools used for direct observation of clinical skills. Pelgrim et al. (2011) completed another review and identified 18 assessment instruments. Both report that WBA tools are primarily intended for formative use with immediate feedback on what they have observed. The fact that there are so many tools available indicates that there are multiple “home-grown” tools being created for particular local needs, which may contribute to unnecessary variability in assessment (Holmboe et al., 2010, p. 679). Some of these locally designed-tools have featured in the pharmacy-specific literature, with small-scale evaluation studies evident (Hill, Delafuente, Sicat, & Kirkwood, 2006). Both reviews indicate that only a small minority of these tools are studied empirically. Hauer et al. (2011) recommend that developing new tools should be avoided, and more emphasis placed on optimising the implementation of existing ones. This would appear intuitively reasonable given that there are so many already in existence. Pelgrim et al. (2011) agree, calling for empirical studies of existing tools that examine effects beyond user satisfaction (which they call ‘happiness data’). However not all academics agree. For example Lurie et al. (2009) argue that difficulties experienced when using WBA tools (despite faculty development efforts)

provide evidence that the tools themselves are problematic (rather than the users), and that there is actually a need for new, well-designed tools.

These studies also highlighted that there are a small number of WBA tools that have been researched more comprehensively and have established use in medicine (Kogan et al., 2009). Examples of five of the most commonly discussed tools and their strengths and limitations are provided in Table 2.3 below. These WBA tools have a particular structure and requirements, generally have associated templates for assessors to fill in, and are often aggregated with other assessments to form a portfolio to make a summative decision about a trainee (Beard, 2011). The structure is key to optimising use in practice (Bok et al., 2013). Some institutions have developed smartphone based applications (apps) to facilitate gathering ratings and feedback in the clinical environment (Barrett, Galvin, Steinert, Scherpbier, O'Shaughnessy, Walsh, et al., 2016). Effective implementation of WBA tools in programmes is challenging, and Bok et al. (2013) highlight that preparation and guidance is key, especially relating to the provision of feedback. It also requires educators to recognise that all WBAs have strengths and limitations and none are perfect (Schuwirth & Ash, 2013).

Table 2.3. Overview of Five Common WBA Tools

WBA Assessment	Description	Key Strengths/Limitations
Mini-Clinical Evaluation Exercise (Mini-CEX)	A supervisor/faculty member observes a trainee taking a patient history and examination, asks the trainee for a diagnosis and treatment plan and provides feedback immediately. It takes approximately 20 minutes. A standard form is generally used to record the data.	The mini-CEX can be completed quickly during the normal activities of the trainee. It is considered one of the most reliable and valid forms of WBA and has been studied frequently (Norcini et al., 2003). It is considered highly acceptable to supervisors and trainees (Hauer, 2000). Approximately 10-12 are required for psychometric reliability (Norcini & Burch, 2007, p. 858)
Case-Based Discussion (CbD)	In a CbD, the supervisor asks the trainee to (1) the explain what has been done, (2) exhibit background knowledge, (3) describe risks or complications, (4) explain how he/she would have acted if the situation or patient had been different	This allows the evaluation of clinical reasoning and facilitates the assessment of decision-making. It should fit easily into the daily workflow. They have been shown to be valid and correlates with other assessments (Norcini & Burch, 2007, p. 862)
Direct Observation of Clinical Skills (DOPS)	Assessment of observed technical skill against a structured checklist. Feedback should be provided immediately after the assessment.	It ensures trainees are given feedback based on direct observation and is intended to help develop procedural skills (Norcini & Burch, 2007, p. 860)
Multisource Feedback/360-degree assessment (e.g. using the Mini-Peer Assessment Tool (mini-PAT))	Views are collected about a trainee's performance using a structured questionnaire from a number of colleagues (and sometimes patients) to gain holistic feedback. These are aggregated, anonymised, compared with self-assessment, and discussed with a supervisor.	Reflects routine performance rather than performance during a specific encounter. A combination of ratings and free-text comments can be collected and fed back to the trainees verbatim. Reliable results can be achieved with 8-12 assessors contributing (Norcini & Burch, 2007, p. 862). Ideally patient views should be included (Davies & Archer, 2005)
Portfolios	Trainees complete various WBA reports or other activities and compile them in a portfolio that is reviewed by a committee or panel. They can be a form of WBA or a method of aggregating evidence of WBAs.	Trainee-to-trainee variation in content of portfolios can vary leading to challenges in evaluation (Bok et al., 2013)

Considering these tools in details highlights that the approach to WBA used in the NPIP does not employ any validated tools. Instead, ratings are made directly at the level of CCF behaviours. According to Ginsburg et al. (2010) this reflects a problematic approach where “medical educators have blurred the distinction between using competencies as an educational framework to organize and guide learning, and attempting to translate them directly into evaluation tools”. This approach potentially lends itself to interns and tutors overlooking the interconnectedness of various competency framework elements (Jarvis-Selinger et al., 2012) and adopting a reductionist approach. The NPIP approach does not facilitate multisource feedback, specific observation of clinical skills, assessment of clinical reasoning, gathering of narrative data about students, or use tools that have established use and/or demonstrated reliability. The scores are recorded as numbers only, which fails to gather and retain the useful rich data used to make decisions about trainees (Schuwirth & Ash, 2013).

2.4.4 Radar Graph Visualisations in Assessments of Competence

A final literature search was targeted specifically towards identifying if radar graphs had been used for WBA in other health professions. Four studies were identified. As they are of particular relevance to this thesis, they are examined in detail in Table 2.4 below. In these studies, the authors’ primary focus is on description of the development of the radar graph-based visualisation software rather than their use in practice. For three of the four studies, no clear description of the design of the research or evaluations are evident, and there is no clarity in any of the studies as to how the authors analysed the data gathered, making it challenging to draw strong conclusions from the findings presented. Notwithstanding this, there are several points relevant to this thesis. It is evident that radar graphs have been introduced to practice

in a number of other disciplines, based on the same assumption that they will help users make sense of large amounts of complex data, and thus benefit the assessment process. They are consistently reported as being well-received by users, and authors have provided clear descriptions of design and development approaches taken which is helpful. However, the studies appear to be lacking the detail to clearly assess methodological rigor and quality, and do not appear to engage with theory in their study design or analysis, and therefore the design for this research was not based on these approaches.

Table 2.4. Detailed Review of Studies of Radar Graphs used in Health Professions WBA

Study	Discipline/ Context	Methodology	Methods	Findings	Strengths/ Limitations	Relevance to this Thesis
Lee and Mak (2010)	Outcomes-based education (OBE): The project aimed to design an integrative web-based system to implement OBE curricula in a user-friendly manner for students and teachers	Not Stated	Evaluation by ‘several educators’ although method of data collection and analysis unclear	An easy-to-use online system that integrated with existing software was developed and implemented. Evaluations are reported as positive.	The priorities for the design are clearly presented, as is the design itself. However, there is very little information provided about the use in practice/evaluation	Authors developed a tool to facilitate OBE assessment using an online tool that integrated into existing systems.
Keister, Larson, Dostal, and Baglia (2012)	Medical education (postgraduate): Aimed to develop a visual tool to overcome limitations of behavioural checklists for direct observation formative and summative assessments	Not stated	Assessment of content validity (assumed because of ‘official’ source of competencies). Assessment of construct validity; response validity	The main findings relate to validity, although it is unclear how the response and internal structure elements discussed have been explored in depth, instead it relies on reporting it worked as predicted, and was used by assessors/residents	Approach taken is clearly described. However, it is a single-site, single-speciality study. The radar graphs presented appear complex.	Authors developed the radar graphing tool to avoid deconstruction of competencies by compiling multiple behaviours into a single visual tool

Study	Discipline/ Context	Methodology	Methods	Findings	Strengths/ Limitations	Relevance to this Thesis
Harrington et al. (2015)	Medical education (postgraduate): Aimed to evaluate whether data presented in radar graph format could help programme directors make sense of large amounts of data collected for summative assessments	Not stated	Modelling of performance using historical data, weighting/grouping of elements agreed by committee (composition unclear), visual inspection of graphs for validity and comparison of radar graphs of 4 residents on remediation vs 26 not on remediation.	The tool was considered to be helpful and has been used by the clinical competency committees with little training required.	The approach taken is well described, however the methodology, methods, and analytical approaches are not clearly stated	Authors developed a radar graphing tool to assist with making meaning from large volumes of data. It has been introduced to practice
Bevitt, Isbel, and Bacon (2016)	Occupational therapy (postgraduate) and dietetics: An eportfolio-based system was developed to help students meet new competency standards, including a radar-graph-based visual display	Case Study	Semi-structured interviews with dietetics students and review during post-placement workshop with occupational therapy students to evaluate attitudes	The visual display of the information was considered somewhat confusing and participants wanted more training. Academics (unclear as to how this data was collected) felt the tool helped 'at risk' student better self-assess.	Approach to development is clearly described. However, the evaluation elements are not well described in terms of design, data collection, or analysis.	Authors developed an e-portfolio-based tool that includes a visual element. Authors evaluated its introduction and gathered some feedback on the tool.

2.4.5 How the Literature Review Informed the Research Aim and Objectives

The overall aim of this thesis was *to explore how the introduction of a novel visualisation tool affects the workplace-based assessment practices of pharmacy interns and tutors in Ireland*. It identified that while CBME and WBA were key elements of the medical education literature, that empirical studies were relatively uncommon, and that this was an important gap in the literature. Based on this finding and the aim of this research the first objective of this research was identified as follows.

Objective 1: To explore current practices, strengths, and challenges in WBA in the NPIP, including the role of technology.

In general, the role of technology had not been researched in detail. Unlike competency frameworks, particular technology requirements for WBA were not generally mandated by regulators, and some authors suggest that therefore it is considered less important (Lurie, 2012, p. 51). The limited literature reviewed above describes studies where technology was studied in isolation, rather than as part of wider practice, which is the aim of this study. Therefore, the second objective relates specifically to the role of the technology (Compass with and without the visualisation tool).

Objective 2: To explore how interns and tutors use Compass with(out) the visualisation tool as part of WBA.

Finally, as I reviewed the literature available, it had become apparent that very few of the published WBA studies employed formal theoretical or conceptual frameworks. From a theoretical perspective, the majority of empirical studies focused on psychometric issues of improving reliability. This focus is reportedly due to the influence of psychometricians who were moving into health professions education research during the time CBME and WBA were evolving (Hodges, 2010). This

reflects the traditional approach to medical education, which according to Regehr et al. (2012) had been

'dominated by a psychometric epistemology in which it is presumed that psychological constructs can be deconstructed and assigned numerical values according to definable rules to obtain an accurate and concise description of an individual's ability that will be objective, replicable, easily communicable, and comparable.'

This dominant psychometric epistemology appears to have resulted in the apparently disproportionate number of publications with a primary focus on faculty development and rating scales. As Regehr et al. (2012) highlight, how a construct is measured, reflects how it is thought about, evolved, and taught resulting in 'trends' in research. In the case of WBA, psychometricians considered reliability metrics a key measure of quality. Therefore, research focussed on calculating these metrics, with reliability of WBAs generally considered 'low' from a psychometric perspective. This subsequently influenced faculty development efforts towards focusing on optimising reliability, and faculty development researchers to focus on how to train assessors to achieve better (Hodges, 2006).

A small number of qualitative studies reported using theory in their design. None appeared to consider issues of epistemology or ontology, leading to the unusual and somewhat incompatible combination of theories and research approaches. For example, Gleeson (2010) studied the introduction of weekly meetings for competency development combining several approaches including communities of practice, 'participative' action research, and social constructivism. It is not clear from the paper how these theories were used to develop the study or frame the analysis. Jarvis-Selinger et al. (2012) combine identity formation theory (individual focus) with communities of practice (collective focus) as part of a narrative literature review to

conclude that identity formation is generally absent from the literature. It is not clear how the distinct theoretical positions are reconciled. Regehr et al. (2012) base their study on a grounded theory approach, but go on to collect quantitative as well as qualitative data, and ultimately report reliability data in their findings which is at odds with the grounded theory methodology.

In this research, I therefore aimed to design a rigorous study that used theory in a systematic manner, as I could see that this was most often absent or inconsistently used in the literature reviewed. Therefore, my third and objective relates to the use of theory:

Objective 3. To explore how using theory contributes to the study of WBA practice.

2.5 Current Issues in CBME and WBA Relevant to this Thesis

Since this project was conceived and designed, the CBME movement has continued to grow and develop. In 2017, the ICBME collaborators published another special issue in *Medical Teacher*, ten years after the first. Somewhat surprisingly, it bears a strong resemblance to the first in terms of focus and content. It opens with an editorial highlighting the importance and growth of the CBME movement (Frank et al., 2017). It contains a series of commentary and perspective pieces prepared by ICBME collaborators on a number of familiar topics. Holmboe et al. (2017) address some (but not all) concerns levelled at the CBME movement, again with limited empirical evidence. In fact, a core argument refuting concerns about CBME is ‘there isn’t much evidence to support the traditional systems that have been in place for over a century’ (p. 578). Englander et al. (2017) provide a commentary on the importance of terminology in CBME. Issues of implementation are discussed in other papers (Caverzagie et al., 2017; Ferguson, Caverzagie, Nousiainen, & Snell, 2017;

Nousiainen, Caverzagie, Ferguson, & Frank, 2017) as is CBME in continuing professional development (Lockyer, Burse, et al., 2017).

There were two papers on assessment and one on research in CBME which are most relevant to this thesis. Harris et al. (2010, p. 607) conclude with a worryingly familiar sentiment that ‘many assessment issues related to CBME remain unresolved, and more data on the effective application of this approach are needed’. A ‘vision for meaningful assessment’ is described in a second paper, that involves timely, ongoing assessments with periodic progress reviews, best use of multiple assessors and assessments, data synthesis and group decisions about competence, faculty development for all trainees, and ‘optimized relationships’ between givers and receivers of feedback (Lockyer, Carraccio, et al., 2017). The special issue concludes with a paper aiming to propose a research agenda for CBME. Gruppen et al. (2017, p. 623) commence their paper by acknowledging that ‘CBME is becoming a pervasive framework for the design and implementation of educational programmes worldwide, yet the research and theory that underlie its principles are still very limited’. They go on to identify several questions that need to be addressed with research including fundamental and conceptual questions, implementation questions, and methodological issues for CBME and WBA. Therefore, this thesis that aims to address issues relating to implementation and practice, as well as theory and methodology so appears to be well placed to add to the literature on WBA.

While high-profile educators have continued to promote CBME and WBA implementation, the debate between those who support it and those who are more cautious persists. This is highlighted in a recent exchange between two high profile authors. Krupat (2018) wants the CBME movement to slow down and ‘avoid the trap of continuing to commit additional resources to an enterprise merely to justify the

effort already expended' (p. 375), and Holmboe (2018) responds (by way of an invited commentary) to address concerns raised by reiterating the potential value of CBME and WBA and the limitations of the previous model. Both arguments are still heavily reliant on theoretical rather than empirical concerns, and neither of them are fully convincing. Krupat (2018, p. 371) seeks to 'urge more public debate, to throw light, not just heat, on the pros and cons of this movement', highlighting that there has been reasonably little critique of the movement.

Boyd et al. (2018) use Foucauldian critical discourse analysis to explore the debate in CBME, tracing recurring arguments in the 49 empirical and 94 non-empirical papers. They identify a 'resistance discourse' from those with concerns about CBME that has highlighted fundamental conceptual critiques of CBME (epistemological and behaviourist critiques). They demonstrate that responses from CBME advocates come in a discursive strategy that minimises critiques and deflects attention from conceptual issues. They claim conceptual critiques are reframed as less critical matters of implementation or interpretation. Thus critical voices are silenced and those 'whose scholarly opinions align with the dominant discourse are accorded legitimacy, whereas other voices are suppressed' (Boyd et al., 2018, p. 53). Through empirically exploring current practice, the role of technology, and the influence of theory on the study of WBA in the NPIP, I aim to add to this debate through generating empirical data through which these issues can be explored.

2.6 Chapter Summary

This chapter aimed to provide context for this research through describing the development of CBME and WBA in the NPIP, with a particular emphasis on technology as it is of key concern in this thesis. In order to situate the NPIP WBA

practice in the health professions education literature, the key literature is reviewed, and used to analyse the NPIP WBA. Literature of specific relevance to this thesis relating to WBA and radar graphs is reviewed in more detail. The development of the research aim and objectives from the specific NPIP context and literature reviewed is described. The literature review revealed two main issues with the WBA literature to-date, namely the lack of empirical research (particularly relating to practice) and prominence of opinion-based publications, and the lack of theory-informed studies. However, with the call for more empirical research strengthening (Gruppen et al., 2017; Holmboe, 2018), hopefully this and other studies can allow us to “problematise unsupported claims” (Boyd et al., 2018, p. 53) and critically analyse the CBME movement in terms of empirical study of practice. Harden (2007) describes three patterns of behaviour relating to OBE that is just as relevant for CBME and WBA in the NPIP, and this research. He describes ‘ostriches’ (who ignore the movement), ‘peacocks’ (who develop and ‘sometimes ostentatiously display a set of outcomes but stop there’) and ‘beavers’ (who actually implement outcomes-based approaches into their curriculum). Having incorporated the CCF into every aspect of our NPIP curriculum we seem to be beavers. Morcke et al. (2013) suggest that beavers should ‘draw on theory as well as authority statements to craft and carefully evaluate curriculum revisions’ to advance the field. Therefore, in the following chapters, I describe how this study was designed to research practice empirically using a comprehensive theoretical framework, which appears timely.

Chapter 3: Theoretical Frameworks and Methodology

Medical education also needs to use methodological approaches that incorporate the effects of complexity on the implementation and outcomes of educational interventions...trying to answer...the fundamental questions of what works, for whom, under what circumstances, and why is a logical step.

–Holmboe (2018)

3.1 Introduction

This thesis explores how the introduction of a visualisation tool impacts on intern and tutor practice during WBA. In Chapter 2, a key limitation in the CBME/WBA literature was identified as the lack of empirical research. Recent calls for theory-informed empirical studies were noted. Therefore, to highlight the role theory in this study of technology and WBA practices, the theoretical framework and its implications for this research are discussed in a dedicated chapter. This chapter explores issues in identifying and using theory for CBME/WBA research, and begin to address the third research objective; *to explore how using theory contributes to the study of WBA practice*. First, the role of theory in this thesis is described. An explanation is then provided as to how the theoretical framework was selected, followed by an overview the key concepts. How the theoretical framework ensured consistency within the methodology, research design, methods, instruments, and analysis is mapped, to demonstrate quality in the overall research design. The chapter concludes with a description of how the theoretical framework relates to the remaining chapters in this thesis.

3.2 Theory in Research

Theory in higher education research can be thought of as ‘representing different ways of characterising the social world’ (Ashwin & Case, 2012, p. 271) or as offering ‘ways of seeing that provide an interpretation of aspects of the world and make descriptive, explanatory and predictive statements about them’ (Trowler, 2012, p. 274). According

to Trowler (2012, p. 276), utilising explicit theory in empirical research has several benefits, simplifying and identifying what is important, suggesting relationships, highlighting causality, providing explanations, and surfacing assumptions and propositions, thus rendering them amenable to critique.

The importance of theory in higher education research is generally accepted (Hammersley, 2012, p. 393), although evidence of engagement with theory in the higher education literature can often be limited (Tight, 2014, p. 127). Use of theory is comparatively emergent in medical education research (Brosnan, 2013), and most often absent in pharmacy research (Stewart & Klein, 2016). As identified in Chapter 2, there is limited engagement with theory in WBA and CBME research, although it is encouraging to see that it has been highlighted as an important concern for future research (Gruppen et al., 2017; Holmboe, 2018).

3.3 Theory and Research ‘Quality’

Theory is increasingly considered an important aspect relating to quality in qualitative research. Appropriate use of theory is incorporated in several guidelines intended to assist researchers, reviewers, editors, and other users of qualitative research findings to determine the quality of research (Santiago-Delefosse, Gavin, Bruchez, Roux, & Stephen, 2016), although not universally welcomed by all (Hammersley, 2007).

Therefore, in order to demonstrate evidence of quality use of theory in this research, recent guidelines published by Twining et al. (2017) are used to frame this chapter. These guidelines act as an organising principle for this chapter, that aims provide a ‘clear audit trail that allows evaluators to make a context sensitive judgement’ about the quality of this research (Hannes, Heyvaert, Slegers, Vandenbrande, & Van

Nuland, 2015). The guidelines from Twining et al. (2017) present a hierarchical series of levels relating to the use of qualitative research;

- Theoretical stance (ontology/epistemology)
 - Research Approach
 - Methodology
 - Design
 - Data
 - Methods
 - Instruments

These levels are used to structure the thesis, but discussion of the data elements (methods and instruments) are deferred until chapters 4 and 5 where they can be discussed more meaningfully in context where they are used. In the following sections, a reminder of the research aim and objectives is provided. How the theoretical frameworks were chosen and employed in the choice of methodology, methods, and analysis is then discussed. This is summarised in Table 3.4 at the end of the chapter.

3.4 Identifying a Theoretical Framework

If the role of the theoretical framework is to underpin the nature of the goals that can be pursued and the research claims that can be made, the selection of an appropriate theoretical framework to facilitate is critical (Twining et al., 2017). The theoretical framework has been described as the ‘blueprint’ for a study ‘the guide on which to build and support your study, and also provides the structure to define how you will philosophically, epistemologically, methodologically, and analytically approach the dissertation as a whole’ (Grant & Osanloo, 2014, p. 13). The theoretical framework

should therefore link clearly to the research aim and objectives, but also my own position as a researcher. Firstly, the research aims and objectives are considered, before moving on to discuss my influence on the research.

3.4.1 The Research Aim and Objectives

In Chapter 2, the development of the aim and objectives of this study informed by the desire to study the new visualisation tool in WBA and a review of relevant published literature is described. The overall research aim: *To explore how the introduction of a novel Visualisation Tool affects the workplace-based assessment practices of pharmacy interns and tutors in Ireland* reflects that my primary interest in this research is in practice. It is exploratory, reflecting the fact that from the literature reviewed it is clear that relatively little is known about WBA practices in general. The objectives (listed below) reflect steps taken to ensure the research aim is comprehensively addressed.

Objective 1: To explore current practices, strengths, and challenges in WBA in the NPIP, including the role of technology (Chapter 4)

Objective 2: To explore how interns and tutors use compass technology with(out) the Visualisation Tool as part of WBA (Chapter 5)

Objective 3: To explore how using theory contributes to the study of WBA practice (Chapters 3 and 6)

3.4.2 My Influence on this Research

The aim and objectives of this thesis indicate that I intended to explore practices in the ‘real world’, examine the impact of a new technology, and consider the role of theory. Of course, I as the researcher have influenced the research aim and objectives through my personal interest in WBA, my role in the development of the Visualisation Tool, and my findings from the literature review. It is important to take account of how my beliefs, values, and expectations underpinned the research decisions I had taken

(Grant & Osanloo, 2014, p. 19). I was personally interested in how the Visualisation Tool might work in the real world, and how it might address some of the concerns of the interns and tutors discussed in Chapter 2. I did not want to narrowly evaluate user satisfaction with the new tool, intern/tutor perspectives on the process, or address a single element of WBA practice (e.g. rating scales) as I had found this frustratingly predominant in the literature. Instead, I wanted to establish current practice no matter how “messy” (Schön, 1987, p. 4).

These statements provide indications of my own ontological and epistemological positions as a researcher, and it is necessary to consider how this impacts this thesis (Grant & Osanloo, 2014). My previous professional training and practice in health sciences represented a mainly positivist, quantitative tradition. In contrast, my doctoral training in Part 1 of this PhD programme had introduced me to the world of interpretivism and subjectivity. I do not fully accept or reject the philosophical stance of either, and believe that both have merit and value in particular circumstances. I have previously used both approaches (albeit separately), and believe that the most important consideration is that a theoretical framework is appropriate for the nature of the research being undertaken and it is used consistently in terms of its own particular epistemological and ontological basis.

This stance reflects a pragmatic ontological (reality is the practical effects of ideas) and epistemological position (any way of thinking/doing that leads to pragmatic solutions is useful). The pragmatic worldview is not committed to any one system of philosophy or reality, allows research freedom of choice in terms of approaches, and recognises that research occurs in the social, historical, political, and other contexts (Creswell, 2009, pp. 10-11). Furthermore, the pragmatic paradigm is often associated with interventions, and empirical work in natural contexts, also aligning with my own

interests in research. I identify with the “classic” form of pragmatism that considers events in social and cultural contexts, and is not specifically tied to particular research approaches described as follows:

Classic pragmatism is not a methodology per se. It is a doctrine of meaning, a theory of truth. It rests on the argument that the meaning of an event cannot be given in advance of experience. The focus is on the consequences and meanings of an action or event in a social situation.

–Denzin (2012, p. 82)

More recently, pragmatism is increasingly associated with mixed methods research, crudely interpreted as merely basing methodological decisions on the basis of “what works” (Morgan, 2014). As Denzin (2012) explains, this problematic approach forgets to take consideration of important paradigm, ontological, epistemological and methodological differences when combining theories and methods. I believe that theory should be used consistently in terms of its own norms, and ensured I considered this in my research design. Therefore, I identify with the description provided by Denzin (2012, p. 85) of a ‘theoretical *bricoleur*’. He suggests that while such a person may use theory from different traditions, they may not feel that paradigms can be “mingled, or synthesized”. That is paradigms as overarching philosophical systems denoting particular ontologies, epistemologies, and methodologies cannot be easily moved between”.

The combination of my own interests and pragmatic position led me to seek out a theoretical framework upon which to base the study that would help me try to understand the role of the Visualisation Tool in practice, reflect the complexity of the real world, and yet allow me to focus sufficiently on the Visualisation Tool itself without becoming techno-centric. In the following sections I describe the steps I took,

broadly based on those described by Grant and Osanloo (2014, p. 19) that led to the identification of the theoretical framework used in this research.

3.5 From the Research Aim and my Influence to Practice Theories

The aim of this research relates to the study of tools in practice. Therefore, I sought to identify an appropriate theory to frame the study design, based on a pragmatic consideration of available options. In his book on practice theories, Nicolini (2012, p. 1) asserts that there is no single unified theory of practice; practice theories consist of number of a broad family of theoretical approaches ‘connected by a web of historical and conceptual similarities’. The use of terms such as practice-based approach, practice standpoint and practice lens in research has become popular, leading to the creation of a practice ‘bandwagon’ (Corradi, Gherardi, & Verzelloni, 2010). The challenge arising from this bandwagon is that *practice* often means different things to different researchers depending on their background and theoretical position, compounded by the fact that several prominent theorists are associated with particular perspectives on practice. Giddens and Bourdieu’s social praxeology, activity theory, and Lave and Wenger’s Communities of Practice, are extensively discussed by Nicolini (2012), but a comprehensive discussion of each is outside the scope of this thesis.

In the upcoming sections, I articulate the rationale for the selection of activity theory as the practice-related theoretical framework in this research in light of my own epistemological and ontological perspectives discussed above. I discuss the key principles of activity theory that are relevant to the research design. I also consider the strengths and limitations of activity theory as a theoretical framework for this research.

3.5.1 Rationale for Choosing Activity Theory

In considering which practice theory, or indeed practice theories (in his book Nicolini (2012) advocates a pluralistic approach to the research of practice) would be most appropriate for this study, I took several factors into consideration. Firstly, the problem to be addressed by this research was to study the introduction of a new Visualisation Tool, with limited understanding of the existing practice, with few existing reference points in the literature. Secondly, as described in Chapter 2, the practice setting and context for this research is highly complex and regulated, and the theory would need to support an investigation in such an environment. Thirdly, it was important to me that the study aim aligned with my interests and pragmatic ontological/epistemological position. I wanted to retain a real world practice perspective insofar as was practically possible.

Drawing on the work of Nicolini (2012) and the literature reviewed in Chapter 2, I identified activity theory as a practice that would be an appropriate framework to underpin the design of this study. Activity theory has been used in studies relating to technology and higher education (Clemmensen, Kaptelinin, & Nardi, 2016), and was increasingly being used in higher and medical education. The ontological and epistemological positions of the theory are congruent with the research aim, and there are relevant pragmatic reasons to use the theory based on the strengths of activity theory in the study of practice and tools (discussed in more detail below).

Despite identifying activity theory as a suitable practice theory and having previous experience with it, undertaking to use activity theory as the framework for this study was not a decision taken lightly. Activity theory has not yet been widely adopted which is likely influenced by the fact that it is often considered intimidating, having roots in the philosophy of Kant and Hegel, Soviet psychology and Marxist

philosophy, with several variations arising from conflicting translation in terms of language and cultural translation to a Western context (Blunden, 2010, pp. 1-12). It was only introduced to researchers in the Western world in the 1970s (Murphy, 2014, p. 21), and is “quite alien in its dialectical foundations, to that of Western theorizing” (Sannino, Daniels, & Gutiérrez, 2009, p. 53).

In the sections below, I discuss the activity-theoretical foundations for the study. I highlight how the philosophical roots of activity theory had an impact on how the theory was used to select research approaches. I describe features of the theory that make it good fit for studying CBME, WBA, and technology. Finally, I relate the principles of activity theory to the overall study design and methods of data collection and analysis employed.

3.6 Activity Theory as a Theoretical Framework

While there is variation in the guidelines as to the extent to which the theoretical framework should be explained and justified (Twining et al., 2017), the aim of this chapter is to provide a detailed account of the particular role of theory in this research. Therefore, in this section, I provide a summary of the main features of activity theory relevant to this study. It is outside the scope of this chapter to provide more than a summary of the contested development of activity theory from its Marxist tradition of dialectical historical materialism in post-revolutionary Soviet psychology to its iteration used in this thesis, but there are many comprehensive accounts available e.g. Blunden (2010).

3.6.1 Marx and the Foundations of Activity Theory; Consciousness, Dialectical Materialism and Practical Critical Activity

The Marxist understanding of consciousness is the core principle that underlies the philosophy of activity theory. Developed by Karl Marx based on the work of Hegel in *Theses on Feuerbach* (1845/1976), this position is based on the fact that according to Marx, understanding of the mind is inseparable from the material conditions of human existence. Whereas Descartes had identified consciousness to be the result of individual contemplation ('I think therefore I am'), Marx defined consciousness to be the product of man's labour as he goes about producing the means of his existence, thus consciousness arises as a result of activity under specific material condition (Blunden, 2010, pp. 93-101). This is the fundamental principle of dialectics, that all human activity is potentially transformative due to the effects on both the world and the human mind through the dialectical relationship between the two (Ollman, 2003). Unlike Hegel's idealist perspective (dialectical idealism), the Marxist concept is materialist. Although the specific term 'dialectical materialism' was never reported in publications by Marx (or Engels) this philosophy was core to their writing, and forms the basis of their work. An extended discussion of the role of dialectics in Marx's work is outside the scope of this thesis, however the concept is important, as it forms the basis for the activity theory concept of contradictions discussed below.

Marx prioritised 'practical-critical activity' over narrow introspection and intervention over interpretation. This is reflected in his famous writing in *Theses on Feurbach* where he states 'The philosophers have only *interpreted* the world in various ways. The point, however, is to *change* it' (Marx, 1845/1976, p. 5). The method of inquiry, Marx's historical empirical method, is where the origins of activity theory are found, clearly indicating that the starting point for inquiry should be *real life* which is where activity theory originates from.

This method of approach is not devoid of premises. It starts out from the real premises and does not abandon them for a moment. Its premises are men, not in any fantastic isolation and rigidity, but in their actual, empirically perceptible process of development under definite conditions. As soon as this active life-process is described, history ceases to be a collection of dead facts as it is with the empiricists (themselves still abstract), or an imagined activity of imagined subjects, as with the idealists.

Where speculation ends – in real life – there real, positive science begins: the representation of the practical activity, of the practical process of development of men.

–(Marx & Engels, 1845/1970, pp. 47-48).

Unlike other practice theories, activity theory has been systematically developed over a more than a century to develop a practice approach that retains several fundamental characteristics of Marx's philosophy such as "a materialist flavour, attention to the role of objects in human activity, and a sensitivity for the conflictual, dialectic, and developmental nature of practice" (Nicolini, 2012, p. 103). These principles have implications for this research. To use activity theory in line with its underpinning ontology and epistemology means that research should focus on studying the material or 'real world' (materialism), gaining knowledge about practice, historical development and change over time (dialectics), and intervention ("the point, however, is to *change* it"). Marx also highlighted the importance of tools in the labour process, and the purposive and social nature of activity. These ideas formed the basis for the development of activity theory by other scholars (Engeström, 2014, pp. xiv-xv). In the following sections I describe how these ideas were developed as part of the evolution of activity theory, focussing on those features relevant to the explanation of the role of the theoretical framework in the overall study.

3.6.2 From Marx to Vygotsky's Concepts of Mediation, Internalisation and Zone of Proximal Development

While Marx famously applied his philosophy in the study of political economy, others became interested in applying his thinking in different fields. The Russian psychologist Lev Vygotsky applied Marx's dialectical materialist philosophy and political theory to the study of psychology in the 1920s and early 1930s (Daniels, 2008, pp. 2-3). He notes this aim clearly in this passage from his seminal book, *Mind in Society*, where he describes the aspirations for his work.

I don't want to discover the nature of mind by patching together a lot of quotations. I want to find out how science has to be built, to approach the study of mind having learned the whole of Marx's method. ... In order to create such an enabling theory- method in the generally accepted scientific manner, it is necessary to discover the essence of the given area of phenomena, the laws according to which they change, their qualitative and quantitative characteristics, their causes. It is necessary to formulate the categories and concepts that are specifically relevant to them – in other words to create one's own Capital.

–Vygotsky (1978, p. 8)

Vygotsky did not agree with the mainstream movement in psychology to separate individuals from their environment to study psychology. He wished to develop a framework to objectively study and explain human activities in context (Blunden, 2010, pp. 119-131). Vygotsky's work resulted in the development of several concepts relevant to activity theory, including mediated action, internalisation, and the zone of proximal development (ZPD) which are of particular relevance to this thesis. These are discussed in turn below.

3.6.2.1 *Mediation*

One of his main contributions to activity theory was his concept of mediation. This moved away from the stimulus-response behaviourist principle developed by Ivan

Pavlov, which was dominant at the time. In the chapter ‘Problems of Method’ in his seminal text *Mind in Society* (Vygotsky, 1978), he discusses the limitations of the stimulus-response framework favoured by behaviourist researchers, and introduces his thoughts on mediated activity. Vygotsky identified that humans never react directly to their environment, but that this is always mediated by some cultural means such as artefacts (tools) or signs. It is depicted as a triad, of artefact-mediated action (Fig. 3.1).

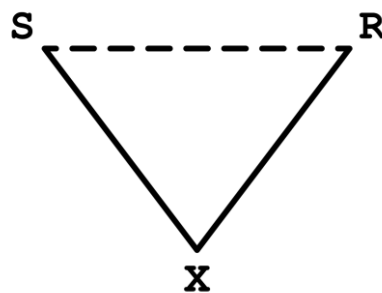


Figure 3.1. Vygotsky’s Basic Triangular Structure: Vygotsky (1978, p. 40) presented a basic triangular representation of the mediated act showing that the relationship between stimulus (S) and response (R) not direct but is mediated (by X)

Vygotsky’s focus on mediation and tools strongly reflects Marx’s view of work i.e. that consciousness exists between the individual and the labour of mankind (Nicolini, 2012, p. 107). His focus on mediation as being central to the study of consciousness and being core to the foundations of activity theory is summarised by Engeström (2001):

The insertion of cultural artifacts into human actions was revolutionary in that the basic unit of analysis now overcame the split between the Cartesian individual and the untouchable societal structure. The individual could no longer be understood without his or her cultural means; and the society could no longer be understood without the agency of individuals who use and produce artifacts. This meant that objects ceased to be just raw material for the formation of logical operations in the subject as they were for Piaget. Objects became cultural entities and the object-orientedness of action became the key to understanding human psyche.

–(Engeström, 2001, p. 134)

Of course, when we are thinking of mediated action, it is important to think about mediators. Within the activity theory literature, mediators are referred to as tools, signs, and artefacts, with different authors ascribing different meanings to each. Vygotsky himself distinguished between technical tools (used to bring about changes in other object) and psychological tools of social rather than organic or individual origin (e.g. language, diagrams, maps, mechanical drawings) (Daniels, 2008, pp. 7-8). Others who have developed activity theory subsequently – most notably Ilyenkov, Wartofsky and Engeström have suggested that the differentiation between material and psychological tools is not helpful. For example, Engeström argues there is a constant movement between external or practical artefacts and cognitive artefacts and categorises them according to how they are used (Engeström, 2014, pp. 49-51).

Vygotsky's work is of particular relevance to this study as it clearly highlighted the role of mediation, and this thesis aims to study the introduction of a new Visualisation Tool. In this thesis I use the term *tool* to refer to mediating artefacts, as it is commonly used in relation to third generation activity theory literature (Engeström, 2014). In this thesis, when using term, I wish to encompass both material and psychological (also known as semiotic) tools in line with the work of Wartofsky and Engeström amongst others (Daniels, 2008, p. 11). Vygotsky developed other concepts of relevance to this research including mediation and the Zone of Proximal Development (ZPD). He used the concept of internalisation to explain how individuals processed what they learned (Yamagata-Lynch, 2010, pp. 17-18). Vygotsky attempted to overcome this narrow focus on the individual through the development of the second concept, the Zone of Proximal Development (ZPD) shortly before his death (Yamagata-Lynch, 2010, p. 18). Vygotsky used the ZPD to elaborate how interactions between individuals and their environments took place, believing that children's intellectual development

should be examined during problem-solving activities rather than by standardised testing (Kaptelinin & Nardi, 2006, pp. 48-49). Engeström builds upon the concept of the ZPD in the development of expansive learning, with an expansive learning cycle completed when people collectively move through the ZPD of an activity (Daniels, 2008, p. 127).

3.6.2.2 *Vygotsky to Leontiev's Activity, Goals and Operations*

While Vygotsky's revolutionary concept of mediated activity provided the foundation of activity theory, it was not yet considered an integrated theoretical framework.

Rather it is Vygotsky's student and co-investigator Alexi Leontiev who is credited with developing Vygotsky's principles into a theory of activity. While the contribution of Vygotsky is not contested, his original focus on the activity of individuals has been criticised (Yamagata-Lynch, 2010, pp. 17-18). Leontiev's contribution to the development of activity theory was to expand the focus from the individual to the collective, an important factor in studying practice (Engeström, 2014, p. xv). He achieved this through discussion of the collective nature of human activity, thus putting mediation in a cultural context (Yamagata-Lynch, 2010, p. 18).

Leontiev famously uses the primeval hunt as a model to explain his theory of collective activity. When a group of hunters went out to catch animals they did so for food or clothing. Not all members would have had the same role, for example some may have been responsible for frightening animals to send them towards other members of the group who were waiting to ambush them. The result of frightening the animals does not directly lead to the satisfaction of his need for food or animal skin. Leontiev highlighted how the group achieved their goal by their joint endeavour via a number of separate but related processes (which he calls actions). Without

consideration of the overall collective activity, the individual's frightening of the animals in an effort to kill them for meat seems senseless. He explained that based on this theory, *activities* are driven by motives, and are realised by goal-directed *actions*. Actions are completed by methods called *operations*, which are related to conditions and may be unconscious. His approach remained consistent with the principles of Marx with a focus on real, concrete activity and developed Vygotsky's concept of mediation with a focus on collective activity in a cultural context.

Leontiev's theory therefore proposed a hierarchy of activity consisting of a series of three unified levels these: *object-orientated activity*, *goal-oriented actions*, and *operations* (Daniels, 2008, pp. 119-121). This is commonly represented using the structure shown below in Fig. 3.2. The activity is driven by goals and motives towards an object, whereas goal-oriented actions are more temporary in nature and may be a step taken as part of participating in an object-oriented activity (Kaptelinin & Nardi, 2006, pp. 62-65). While Leontiev had developed activity theory to an important point it was the Finnish researcher Yrjo Engeström developed this further to create one of the most commonly used versions of activity theory, and this development is outlined in the following section.

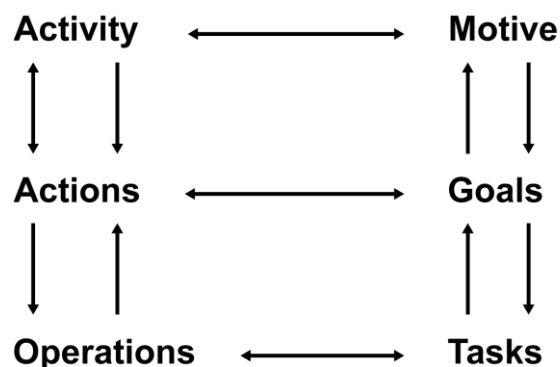


Figure 3.2. Leontiev's hierarchy of activity, actions, and operations.

3.6.2.3 *From Leontiev to Engeström's Activity System*

The form of activity theory primarily used in this thesis was developed by Yrjo Engeström and is described as 'third generation' activity theory. Engeström himself categorised the development of activity theory in three generations, the 'first generation' drawing on Vygotsky's concept of mediation, the 'second generation' drawing on the work of Leontiev, and the third generation building on these foundations as follows:

Third generation activity theory expands the analysis both up and down, outward and inward. Moving up and outward, it tackles multiple interconnected activity systems and their partially shared and often fragmented objects. Moving down and inward, it tackles issues of subjectivity, experiencing, personal sense, emotion, embodiment, identity, and moral commitment.

—(Engeström, 2014, pp. xv-xvi)

In his 1987 edition of *Learning by Expanding*, Engeström introduced his first triangular model of activity. He described it as "[...] the smallest and most simple unit that still preserves the essential unity and integral quality behind any human activity". He presents it as the basic unit of analysis for activity and developed the model shown in Fig. 3.3 to represent it.

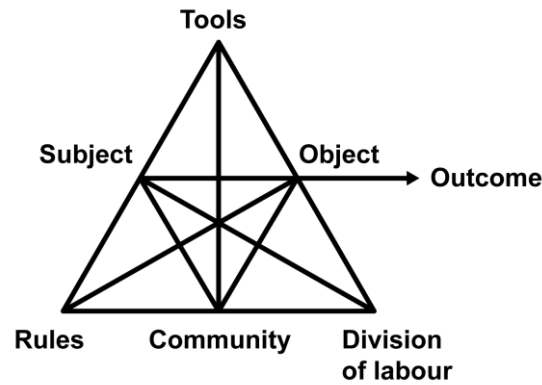


Figure 3.3. Engeström’s basic unit of analysis, the activity system. This structure contains the Vygotskian triad of tool mediated action (inverted) at the top of the structure and four other elements to form a model of human activity (Engeström, 1987, p. 78).

The model is comprised of seven elements (see Table 3.1 below for definitions of each). It incorporates the Vygotskian triad of tool-mediated action (at the top), but has been expanded to show the mediators of collective activity and the community of which they are members. The object of activity is mediated by tools. The community is mediated by the division of labour, and the rules mediate how the subject and community work together. The rules, community, and division of labour elements of the activity system add the socio-historical aspects of mediated action (Engeström, 2014, pp. xv-xvi). Although it is possible to define each element individually, it is important to note that Engeström does not intend the elements to be considered individually, they form part of the activity *system*. Instead, the relations between the nodes are critical to the study of particular activities.

Table 3.1. Definitions of the Elements of the Activity System

Element	Definition
Subject	The individual or sub-group whose perspective is taken for the analysis
Object	The aim of the subjects in the activity system, the subjects work towards this using different tools
Tools	The mediating tools or artefacts, they may be technical or psychological
Community	The group of individuals whose activity is orientated to the object which is shared
Division of Labour	Who performs what actions in relation to the shared object, how responsibility and power are divided
Rules	May also be known as norms, they are the shared culture of the activity system. Rules may be explicit or implicit, and may include regulations, ‘unwritten rules’, cultural practices etc.
Outcome	What is actually achieved, possibly quite different to what was desired or intended

While this single triangle structure was originally introduced as the model for the unit of analysis, it has since been developed further by Engeström himself to reflect development of the theory. He now identifies the minimal unit of analysis as *two* interacting activity systems (a model is shown below in Fig. 3.4), with a (partially) shared object. He outlines the rationale for this development in the extract below.

“The third generation of activity theory needs to develop conceptual tools to understand dialogue, multiple perspectives and voices, and networks of interacting activity systems. In this mode of research, the basic model is expanded to include minimally two interacting activity systems”

–(Engeström, 2001, p. 135)

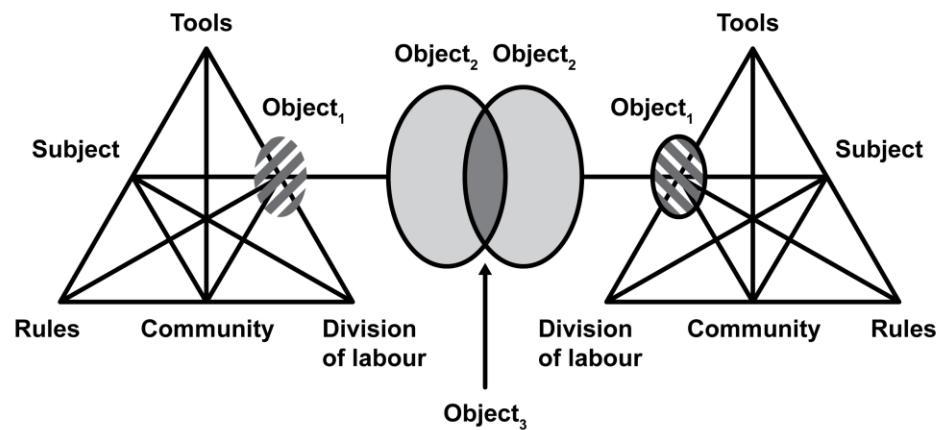


Figure 3.4. The revised unit of analysis. Two interacting activity systems with a shared object. Adapted from Engeström (2001)

This moves the unit of analysis to joint activity or practice, rather than individual activity, aiming to develop conceptual tools and to understand dialogues, multiple perspectives and networks of activity systems, this is particularly helpful when considering complex systems (such as practice). The activity system discussed above provides a model that is widely used by researchers to operationalise activity theory, but it is important to bear in mind that this is simply a model. The model should be used with close reference to the theoretical principles upon which activity theory is based, and these are discussed below.

Engeström suggests that activity theory can be summarised based on five principles.

The principles are listed below (Engeström, 2001, pp. 136-137).

1. Unit of Analysis: A collective, artefact-mediated, object-orientated activity system, seen in its network relations to other activity systems is the prime unit of analysis.
2. Multi-Voicedness: An activity system is multi-voiced, a nexus of multiple points of view, traditions and interests, increasing exponentially in networks of activity systems. The division of labour creates different positions for participants.

3. **Historicity:** Activity systems evolve and develop over lengthy periods of time and their problems and potentials can only be understood against their own history.
4. **Contradictions:** Contradictions are the source of change and development (discussed further in Chapter 4). Contradictions are historically accumulating structural tensions between activity systems, generating disturbances and conflicts, but also innovative attempts to change the activity. He classifies contradictions according to four levels (Table 3.2).
5. **Expansive Transformation:** There is a possibility for expansive transformations in activity systems, as activity systems move through long cycles of qualitative transformations. When contradictions are aggravated, some participants begin to question and deviate from the established norms, sometimes escalating into a deliberate collective change effort. A full cycle of expansive transformation can be understood as a collective journey through the zone of proximal development of the activity.

Table 3.2. Engeström’s Four Levels of Contradiction

Level	Description
Level 1	Primary inner contradiction within elements of the central activity system
Level 2	Secondary contradiction between elements of the central activity
Level 3	Tertiary contradiction between existing forms of the central activity system and a culturally more advanced form of the activity
Level 4	Quaternary contradictions between the central activity and its neighbouring activities

3.6.2.4 *Summary of Activity Theory’s Origins and Implications for this Thesis*

In this section, I have shown how activity theory’s historical development can be traced directly back to its roots in Marxist philosophy, and this has implications when

using the theory to inform the development of my methodology and research approaches. In this thesis, I primarily use Engeström's third generation activity theory. Engeström's five principles of unit of analysis, multi-voicedness, contradictions, historicity, and expansive development reflect the lineage of thought from Marx through Vygotsky and Leontiev and are used to derive the conceptual frameworks for the later chapters. These philosophical principles reflect, and make explicit, the dialectical materialist underpinning of activity theory that will be reflected in the methodology, design, methods, instruments and analysis.

The theoretical framework has particular features that have direct implications for the choice of methodology and methods in the study. From Marx's perspective, the research should focus on the material real world, and this basic premise, a focus on practical-critical activity that can be traced through to modern instantiations of the theory. Vygotsky extends this focus slightly, suggesting that capturing the historical study of development and change is key from his perspective stating:

To study something historically means to study it in the process of change; that is the dialectical method's basic demand. To encompass in research the process of a given thing's development in all its phases and changes – from birth to death – fundamentally means to discover its nature, its essence, for 'it is in only in movement that a body shows what it is.' Thus, the historical study of behavior is not an auxiliary aspect of theoretical study, but rather forms its very base.

–Vygotsky (1978, pp. 64-65)

Therefore, the strength of activity theory as a theory to study practice lies in its focus on real life, human activity, multiple perspectives, development, and change in the context of the activity itself. It also facilitates the study of complex practice without requiring fragmentation, or a focus on a single topic, instead it recognises that practice is a complex set of relationships where changing one element within the system has implications for other elements. Authors have reported using activity theory for several reasons including

contextual situation, using helpful concepts, studying complex topics, studying change, to build on the work of others, or because activity theory fit with the researchers' epistemological position amongst other reasons (Bligh & Flood, 2017, p. 136).

3.6.3 Criticisms and Limitations of Activity Theory

Of course, like any other theory, there are criticisms and limitations that need to be acknowledged when selecting a theory. I have already explained that activity theory is challenging for researchers to employ due to its philosophical origins.

The criticisms of the foundational work by Vygotsky (individual focus), and Leontiev (lack of a model), have already been discussed. Engeström's triangular model has also come under scrutiny by others, with suggestions that there are too many elements for it to be 'tenable' (Blunden, 2010, p. 231), that it has no explanatory value for certain activities (Bakhurst, 2009, p. 206), and that it is somehow static "you must be very cautious about given, stable, structural representations where you aspire to dynamism, flux, reflexivity, and transformation" (Bakhurst, 2009, p. 207). Engeström strongly rejects these criticisms. He suggests that Bakhurst's concerns are unfounded as his understanding of what constituted an activity was incorrect and he was misinterpreting the function of the diagram, which is "a tool for analyzing those transitions and transformations" (Engeström, 2014, p. xxviii).

3.6.4 Activity Theory – a Brief Comparison with Other Theoretical Frameworks

When selecting a theoretical framework, despite any potential benefits and limitations, it is important to consider alternative theoretical frameworks. I believe activity theory to be the most appropriate based on the potential for the theory to facilitate study of complex practice, and its focus on mediation, tools, and the real world. However,

there are other theories that warrant brief discussion, in terms of their potential applicability for this research.

Other sociocultural theories e.g. situated learning (Lave, 1991) and communities of practice unities (Wenger, 1998) also have the potential to understand workplace-based learning and assessment practices. The challenge with using situated learning theory in this research is that there is a requirement to look for well-defined communities, but in the case of workplace-based assessment, the interns and tutors work in almost 200 different training establishments, with very different combinations of institutions and practitioners, so it would not be as appropriate in this instance (Engeström, 2001, p. 140). Its focus is not sufficiently specific in terms of the use of tools to make it the most appropriate choice for this research.

Actor-network theory (ANT) is another theory that can be used to frame research of practice. It is often used in studies relating to the role of technology, meaning that it was worth consideration for the purposes of research. It has been criticised for its lack of distinction between humans and non-humans in studying practice, and it therefore appears to overlook human properties such as intentionality (Fenwick, 2010, p. 3). It facilitates description of how networks are built, rather than analysis of social activity within networks, and has a “practical inability to sufficiently include mediation” (Sayes, 2017). Having recognised in the literature review that the role of the trainee and supervisor are very important, and that social activity is required as a core element of WBA which exists in particular contexts, I realised it would not form a good basis upon which to develop this study.

3.6.5 Summary of Theoretical Framework

The theoretical basis for this research originates from the aim and objectives of this study combined with the influence of my own ontological and epistemological positions. I endeavoured to select theory that could support this study and allow me to realise the aim and objectives of the research. Activity theory appears useful as a practice theory that foregrounds the use of tools in the study of practice and may be relevant to others studying CBME.

I have provided a comprehensive summary of the theory and its philosophical roots with the goal of addressing a recognised deficit in CBME studies (Gruppen et al., 2017; Holmboe, 2018), as well as providing a clear statement of the epistemological and ontological positions adopted in the design of the research approaches used in thesis. Providing this background will allow me to demonstrate ‘the consistency of the underpinning theoretical stance with the overall approach, and internally between the methodology, design, instruments, and analysis’ in line with the guidance of Twining et al. (2017) in the following sections where I discuss the research approach.

3.7 From Theoretical Frameworks to Research Design

Having considered the theoretical stance, I then needed to identify how to develop the research ‘approach’. According to Twining et al. (2017) this consists of methodology, design, and data elements and should be ‘internally consistent and informed by the research questions’. In the following sections, I explain how I ensured the methodology, design, and data aligned with the theoretical framework.

3.7.1 From Theory to Methodology (Research Paradigm)

The methodology should reflect three factors. Firstly the overall goals of the research, secondly the research questions or objectives arising from these goals, and thirdly the

underpinning ontological and epistemological positions adopted in the study (Twining et al., 2017). At its simplest level, a choice between quantitative, qualitative and mixed methods (combination of quantitative and qualitative) methodology was required. While it is increasingly recognised that qualitative and quantitative approaches should not be necessarily considered as opposites, it is generally agreed that they have fundamental differences in ontological and epistemological positions. (Cohen, Manion, & Morrison, 2011, p. 21).

Traditionally, quantitative research aims to test objective theories and relationships among variables producing number-based data for statistical analysis and qualitative research aims to explore meaning and understanding in groups or individuals embracing complexity and using words e.g. themes rather than numbers as data (Cohen et al., 2011, pp. 21-22). Mixed methods research combines or associates qualitative and quantitative forms of research, generally with the aim of strengthening a study. While many researchers aim for this approach, study design should be carefully considered as there may be significant differences in ontology and epistemology, making the synthesis of findings problematic (Creswell, 2009, p. 4).

Therefore, in order to identify the appropriate methodology, the three factors outlined above were considered, alongside the methodological options. The overall goal of the research was to study the introduction of a new Visualisation Tool into existing practice. My research aim indicated a primary interest in the exploration of a complex practice and the role of a new Visualisation Tool. From the theoretical framework employed, the research should focus on the real world experience of participants at collective level and on intervention. A positivist approach encounters limitations in the study of the complexity of human behaviour (Cohen et al., 2011, p. 7). Therefore, it was not considered suitable for this research either

alone or as part of a mixed methods study. I identified that a qualitative methodology would best suit my overall goals, the research aim and objectives, and fit with the theoretical frameworks.

3.7.2 From Methodology to Design and Ethics

Having identified a qualitative approach as most appropriate, I needed to identify a study design. Qualitative studies are associated with five principal designs/methodologies.

According to Cousin (2009) and Creswell (2009, p. 13) five approaches are:

- Narrative inquiry (studying lives of individuals using stories)
- Phenomenological research (identifying the essence about a human phenomenon as described by participants),
- Grounded theory research (developing a theory about process, action or interaction using views of participants),
- Ethnographic research (studying a cultural group in a natural setting over a prolonged period)
- Case study research (exploring in-depth a programme, event, activity, or process bounded by time and activity)

I identified a qualitative case study as the most appropriate design for my research.

Case study research is defined as “a study of a contemporary, real phenomenon, which involves ‘thick description’ of a subject through multiple sources of data or multiple methods” (Cheek, Hays, Smith, & Allen, 2017, p. 480). Contrary to widespread misunderstanding about the role of case study research, it has the potential to generate rich data and support the investigation of a wide variety of issues (Flyvbjerg, 2006).

This study used a single (no comparative analysis) diachronic (describing change over the time) case study design (Cheek et al., 2017, p. 482).

Case studies are considered an appropriate methodological approach for activity theory-based research because they involve the examination of self-sustained systems that are difficult to remove from context (Yamagata-Lynch, 2010, p. 79). They can be used to frame holistic investigation of complex situations that have multiple interwoven elements (Cheek et al., 2017, p. 482). This aligns conceptually with the ‘unit of analysis’ concept highlighted in Engeström’s work (Engeström, 2014). Yin (2009, p. 32) stresses that case study research should investigate real life phenomena rather than concepts, and this also reflects the materialist origins of activity theory. Data collection in case study research primarily involves observation in a naturalistic setting (the real world), and this is compatible with the epistemology and ontology of the activity theory approach. An assorted set of methods and data sources that align with the research aims/questions and theoretical framework are combined, and triangulation is often employed in order to improve reliability (Cousin, 2009, p. 136). According to Cheek et al. (2017, p. 486) well-structured clearly written case study research has the potential to “increase understanding of complex situations through critical analysis and clarification of contributing factors, challenges to assumptions, and guidance for ‘intelligent action’ that may have relevance more broadly”. Therefore, case study was an appropriate methodology for this research.

Cousin (2009) considers ethics an important element relating to qualitative and case study design, as data are gathered from a small number of participants and may be personal. When using activity theory this is also important, as data is ideally collected in real world settings, including by observation. In this research, I obtained ethical approval from Lancaster University prior to commencing data collection for each stage of my research (details provided in Chapters 4 and 5). Informed consent was

obtained from all participants prior to their involvement in the research, and the rights of participants such as confidentiality and data protection were respected.

3.7.3 From Design and Ethics to Data

According to Twining et al. (2017) after identifying a research design that aligns with the ontology/epistemology, the ‘data’ element should be considered. This comprises of three elements, methods, instruments and analysis. It should be congruent with the other elements of the study design, including theoretical framework and research design. Unlike other theories commonly used such as phenomenology, which requires interviews as a method of data collection, activity theory does not prescribe the use of specific research methods. Vygotsky himself recognised the importance of using appropriate methods, but noted that this was a challenge (Vygotsky, 1978, pp. 58-75), going on to develop his own methods, including the double-stimulation method used in Chapter 5. Engeström also acknowledges this challenge.

Activity theory is not a specific theory of a particular domain, offering ready-made techniques and procedures. It is a general cross-disciplinary approach, offering conceptual tools and methodological principles, which have to be concretised according to the specific nature of the object under scrutiny

–(Engeström, 1993, p. 97)

Similarly, case study research does not usually rely on one method of data collection – instead multiple sources of data are used. Yin (2009, p. 98) identified ‘six sources of evidence’ for case studies; documents, archival records, interviews, direct observation, participant observation, and physical artefacts. Using multiple methods in case study research makes findings likely to be more accurate and credible (Yin, 2009, p. 116). Therefore, activity theory researchers using case study methodology employ a variety of methods depending on the object of the inquiry (Yamagata-Lynch, 2010, p. 70). The selection of methods will relate to the activity theory concept chosen. Some key

considerations when using third generation activity theory are mapped to the activity system elements below for illustrative purposes.

Table 3.3. Overview of how Activity System Elements Impact Choice of Methods

Activity System Element	Impact on Choice of Methods
Unit of analysis	Methods chosen needed to facilitate the collection of data pertaining to the activity system i.e. the two interacting activity systems.
Multi-voicedness	Methods chosen needed to collect data that represented the views of multiple points of view represented in the activity system.
Contradictions	Methods chosen needed to identify tensions actually arising in the system arising from various sources.
Historicity	Methods chosen needed to allow sufficient consideration of the history and development of the activity system.
Expansive Transformations	Methods chosen would need to allow the identification of ‘expansive learning’ e.g. where participants deviate from existing norms resulting in a deliberate collective change effort.

As I employ several methods of data collection to ensure a comprehensive investigation of the research aim and objectives, I discuss quality parameters of individual methods, instruments, sampling, data collection and analysis in more detail in the chapter relating to their application to provide context (Chapters 4 and 5). This also reduces duplication in the thesis, as a noteworthy challenge for qualitative research is addressing all requirements within restricted word counts (Twining et al., 2017).

3.8 Chapter Summary

This chapter was purposefully dedicated to an in-depth discussion of selecting appropriate theory and methodology to study WBA practice. Before moving on to Chapters 4 and 5 where the related methods are explained and the empirical research

is presented, it was important to highlight the impact of the theoretical framework and methodology on the overall structure of this research. Such a deliberate discussion of theory and methodology is particularly important in this study of WBA in the context of pharmacy, as this area is not widely researched (as identified in Chapter 2), and the available studies do not use theory robustly as part of their design. Dedicating this chapter to describing a practice theory and methodology reflects calls for both studies of practice to be undertaken (Holmboe, 2018), and for such studies to be appropriately theory-informed (Morcke et al., 2013).

Theory and methodology were considered so important to this research that the third research objective relates to exploring the role of theory in studying WBA practice. This is discussed further in Chapter 6. While it is important that the CBME/WBA literature embraces theory to a greater degree than is currently evident, it is also important that this is done in a manner that ensures quality in research design. Therefore, this chapter addressed three things. Firstly, I describe how I identified appropriate theoretical frameworks based on the research aim and literature review and explained how my position as a researcher influenced this choice. Secondly, I identified suitable guidelines that ensured the theoretical framework was applied in a manner that reflected good quality in qualitative research. A summary of this is provided in Table 3.4 below. Thirdly, I provided an overview of the origins of the theoretical frameworks used, highlighting the features that are most relevant to this thesis and researching CBME and WBA.

Table 3.4. Overview of Quality in Qualitative Research in Thesis

Level		Guidance	Comments Relating to This Research
Theoretical Stance	Ontology and Epistemology	The critical issue is to be clear about one's underpinning theoretical stance and ensure there is explicit alignment and consistency within the approach and thus between the methodology, design, methods, instruments, data and analysis.	Section 3.4.2 outlines the ontology and epistemology relevant in this study. It is explicitly stated and forms the basis for the rest of the study design
Approach (must be internally consistent and informed by research aim/question(s))	Methodology	<ul style="list-style-type: none"> • Must align with the underpinning ontological and epistemological assumptions, which should be stated. • The goals of the research should be clear. • The research should be informed by relevant literature which is still current. 	<ul style="list-style-type: none"> • A qualitative methodology is used in this study. This is in line with the stated epistemological and ontological basis of this study. • The goals of the research are clearly set out and justified in Chapter 1 and restated in this chapter • A comprehensive literature review in Chapter 2 sets out where this study sits in the contemporary competency based education literature, specifically in the context of the role of technology and tools
	Design	<ul style="list-style-type: none"> • Must align with methodology. • Should be clearly articulated and justified. • Should address ethical considerations. 	<ul style="list-style-type: none"> • Case study design aligns with a qualitative methodology • The use of case study research has been explained and justified in terms of the investigation and theoretical framework • Ethical considerations are discussed here and also in Chapters 4 and 5.

Level		Guidance	Comments Relating to This Research
	Data	<p>Methods and Instruments</p> <p>Must align with the methodology and design. Should be appropriate, feasible, and fully specified, including who carried out the research, the context of the research; the cases/participants; how data were collected (including details of any instruments used); how the data collection process evolved.</p>	<ul style="list-style-type: none"> Principles relating to the selection of methods relating to the theory and methodology are discussed Specifics concerning the data (methods, instruments and analysis are discussed in the relevant chapters to avoid duplication in this thesis).
		<p>Analysis</p> <ul style="list-style-type: none"> Must align with methodology, design, methods, and data. The techniques for processing data and drawing inferences should be fully described and justified. The depth and breadth of the data should be made clear. Should be reflexive. Should go beyond description. Should be critical. Should make clear how findings relate to existing literature. Should make clear its limitations and broader relevance. 	

Chapter 4: Exploring Existing Practice Using Activity Theory

A practice approach lies in its capacity to describe important features of the world we inhabit as something that is routinely made and re-made in practice using tools, discourse, and our bodies.

–Nicolini (2012, p. 2)

4.1 Introduction

The main aim of this thesis is to explore how the introduction of the Visualisation Tool affected WBA practices of pharmacy interns and tutors in Ireland. Therefore, this chapter aims to address the first objective of this study, *to explore current practices, strengths, and challenges in WBA in the NPIP, including the role of technology*. Establishing current practice is vital to understanding the potential impact of the Visualisation Tool to change practice. An empirical study of WBA practice also addresses a gap in the literature, which has to-date focused on individual elements (Gruppen et al., 2017; Holmboe, 2018).

However, studying practice is known to be challenging. The quote from Nicolini (2012) at the start of the chapter captures this complexity well. In Chapter 3, activity theory is identified as a practice theory that embraces complexity (Yamagata-Lynch, 2010, p. 1), and in the following sections, how this was used to achieve this objective is outlined. Firstly, activity theory concepts relevant to this chapter and how they influenced the selection of methods and analysis are explained. Next, the research is presented in three parts. Firstly, I explore normative practices as activity systems using document analysis. Secondly, I refine the activity system to represent actual practice based on focus groups with interns and tutors and discuss the strengths and challenges identified in the context of the findings from Chapter 2. Thirdly, I discuss

how findings relate to the Visualisation Tool in anticipation of Chapter 5. Finally, a summary is provided.

4.2 Activity Theory Principles and Methods

In Chapter 3, a comprehensive rationale for the choice of a qualitative case study using an activity theory framework was provided. It was also noted that activity theory does not provide guidance on selection of methods or analysis (Engeström, 1993, p. 97), but it requires the observation of specific principles (see section 3.6.2.3). Instead, it is necessary to select methods compatible with the principles of the theory and the research setting to gather and analyse data. Justification for the choice of methods based on the theoretical principles is provided below to clearly demonstrate how it aligns with the overall theoretical framework (Twining et al., 2017).

4.2.1 Activity Theory Principles and Implication for Selection of Methods

The first principle of activity theory is that a collective artefact-mediated and object oriented activity system is the prime *unit of analysis* for the investigation. In this chapter, the unit of analysis is Engeström's minimal unit – two interacting activity systems (Engeström, 2001, p. 136), as shown in Fig. 4.1 below.

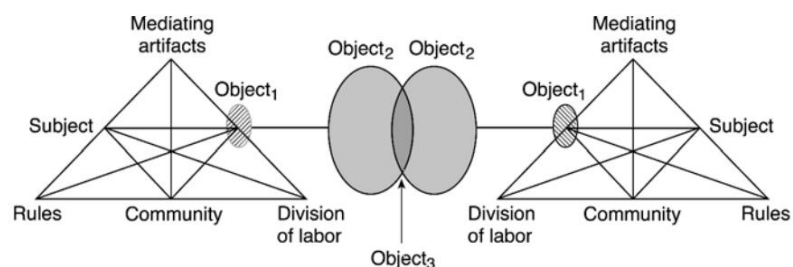


Figure 4.1. Unit of Analysis: The unit of analysis is interacting activity systems (intern and tutor) with a partially shared object.

Therefore the method(s) chosen needed to appropriately represent the perspectives of the two primary subjects (interns and tutors) in sufficient detail to comprehensively describe elements of the activity system (Daniels, 2008, pp. 123-126).

Activity systems are *multi-voiced* and represent many points of view, traditions, and interests based on their diverse histories. This is multiplied in networks of interacting activities (Engeström, 2001, p. 136), such as this research where there are two (see Fig. 4.1). Therefore, the method(s) chosen appropriately accommodated the collection of multiple perspectives on WBA practice.

Activity systems take shape and transform over periods of time, and should be considered against their own history. This third principle is termed *historicity*. History should be considered in terms of the local history of the activity but also the theoretical ideas and tools that have shaped the activity (Daniels, 2008, p. 124). This means that it was necessary to consider the origins of the WBA practice in detail and interpret the findings carefully in terms of the history and literature described in Chapter 2.

Engeström (2001, p. 137) terms the fourth principle *contradictions*. He highlights the central role of contradictions as sources of change and development. Distinct from problems or conflicts, they are historically accumulating tensions that arise within and between activity systems. They are a source of disturbances and conflicts, but also innovations. They should be considered in terms of how they manifest in activity systems materially or discursively (Engeström & Sannino, 2011). The methods chosen would need to be able to identify these contradictions in existing WBA practice.

The fifth principle relates to the potential of activity systems to undergo *expansive transformations*. This happens when contradictions are aggravated and participants

begin to deviate from established norms, in some cases escalating to a collaborative collective change effort where the motive and object are reconceptualised (Daniels, 2008, pp. 125-126). Therefore, methods would need to allow such information to be gathered.

4.2.2 Choice of Methods

While the theoretical principles had the primary influence on the choice of methods, practicalities were also an important consideration. Yamagata-Lynch (2010, pp. 63-79) provides a comprehensive overview of issues to be considered when selecting methods and analytic approaches when using activity theory. She suggests that observations, interviews (individual or group), and document analysis are all approaches that are compatible with activity theory, and that practical considerations will also influence selection (Yamagata-Lynch, 2010, p. 70). While observations are useful for providing first-hand experience of participants' activities, there are practical, logistical and ethical issues associated with observing practice in healthcare environments, and participants may feel uncomfortable with being observed (Heath, Hindmarsh, & Luff, 2010, pp. 10-13). These challenges were previously found to also arise in observational studies based in pharmacies (Parry, Pino, Faull, & Feathers, 2016). Alternative approaches, such as interviews and focus groups can help gather information about the participants' natural setting, experiences, and details about activity system elements (their community, how they use tools etc.). In this research, practical considerations such as participant recruitment for each of the elements, and feasibility of data collection also contributed to decisions relating to selection of methods. For example, document analysis can allow researchers to find contextual information such as rules, and verify information identified from other sources such as interviews, but access to

certain sources may be challenging (Yamagata-Lynch, 2010, p. 71), e.g. if the materials are not available for research purposes.

The strengths and practicalities of each approach were considered. For the purposes of this chapter, document analysis and focus groups were identified as the most appropriate methods to gather the required data. As observations have additional ethical and practical considerations, access to and recruitment of participants may be more challenging (Heath et al., 2010, pp. 14-19), and recognising that these approaches would be vital when addressing the second study objective they were not used in this part of the research.

In this chapter, the methods are used sequentially. First, document analysis is used to study how tutors and interns learned about the WBA practice. These findings are used to develop a 'normative' activity system, representing what *should* happen. This is because Nicolini (2012, p. 227) suggests that the first step in studying practice should 'zoom in' to how it is learned. This allows researchers to understand the "specific ways of seeing, talking, and feeling that make a person a member of that specific practice". This would therefore provide important context and allow for triangulation of other findings. It was also a helpful approach to facilitate a critical reflection on faculty development, which was a key feature of the WBA literature reviewed in Chapter 2, and an important aspect of WBA (Holmboe et al., 2010). While this would help establish what practice *should* be, and consider faculty development, it would not allow the exploration of what it *actually was* in reality, or the identification of the strengths and weaknesses in practice and compare these to the literature in Chapter 2, or the role of technology in existing practice. Therefore, the focus groups were used as a second method to gather data relating to elements of the activity system, in line with the activity theory principles described. Using two methods of data collection is also associated

with improving quality, as it allows triangulation of findings and increases certainty in results (Twining et al., 2017). In the following sections, use of the document analysis (section 4.3) and focus groups (4.4) methods are described

4.3 Document Analysis

Document analysis is a qualitative data collection method compatible with this study design that was based on activity theory and case study research. It is an approach in which the investigator examines material documents and artefacts that participants produced or are available at the research site (Yamagata-Lynch, 2010, p. 141). Document analysis facilitates research into the past, processes of change, and continuity over time (Cohen et al., 2011). It therefore aligns well with Engeström's (2001) principles. Documents are often traditionally considered as being in the form of writing, but can engage other formats such as video and audio files (Prior, 2008).

4.3.1 Data Source Identification

The activity theory principle of the unit of analysis (two interacting activity systems) was used to guide selection of data sources. From this perspective, data sources needed to represent the points of view of the subjects of the activity systems (interns and tutors). In the NPIP, all training and orientation materials are made available to interns and tutors via the VLE only. Therefore, using test VLE accounts with the same access rights as interns and tutors it was possible to identify relevant material for inclusion in the document analysis. 'Documents' were in several file formats, including Microsoft PowerPoint® slides, and portable document format files (PDFs), and discussion fora. Shareable content object reference model-based (SCORM) files that incorporated narrated PowerPoint®

slides with video elements were also included. All data sources identified for interns and tutors are presented along with their authors. To provide an indication of how many of each were available for analysis, a number is provided in parentheses beside each source (e.g., PDF (1) means there was one PDF). The sources are listed in Table 4.2 below. Sources were also coded with a letter (a-l).

Table 4.1. Data Sources Identified for Document Analysis for Interns and Tutors

	Resource Name	Document Type (number)	Source/Author(s)
Subject: Interns	a. Orientation Day Presentation for Interns	PowerPoint® Slides (1)	Programme Director for Academic Studies, Programme Director
	b. Intern eLearning materials	Orientation module SCORMs on VLE (3)	Programme Director for Academic Studies
	c. Appraisal dates [Intern VLE]	PDF (1)	Programme Coordinator
	d. Intern general announcements forum	Discussion forum (1)	Programme Coordinator
	e. PSI (Education and Training) Rules 2008 [Intern VLE]	PDF (1)	PSI (regulator)
	f. Marks and Standards for NPIP [Intern VLE]	PDF (1)	Programme Director for Academic Studies, Programme Director
Subject: Tutors	g. Tutor handbook	PDF (1)	Programme Director
	h. Tutor general announcements forum	Discussion forum (1)	Programme Coordinator
	i. Appraisal dates [Tutor VLE]	PDF (1)	Programme Coordinator
	j. PSI (Education and Training) Rules 2008 [Tutor VLE]	PDF (1)	PSI (regulator)
	k. Tutor eLearning materials	SCORMs on VLE (14)	Various contributors (faculty/external)
	l. Tutor Training Day Slides	PowerPoint® Slides (7)	Programme Director, Programme Director for Academic Studies

4.3.2 Data Analysis

Analysis of data in document analysis involves a systematic, stepwise approach to the review of the selected data sources. The analysis was based on the approach described by Bowen (2009). This process involved firstly *skimming* the material for superficial examination, secondly *reading* the material for a more thorough examination and finally *interpretation*. Bowen's (2009) approach suggests that first, content analysis should be used to identify meaningful passages of text or other data in a 'first-pass document review'. Next, coding should be completed using thematic analysis either with predefined codes or by inductively generating codes *a priori* (Bowen, 2009, p. 32). In this research, deductive thematic analysis (Kuckartz, 2014, p. 59) was used with activity system elements as the predefined codes to reflect the activity theory-based design. Using the activity system elements (subject, object, tools, division of labour, community, rules) as codes allowed me to identify activity system components and map them directly onto a diagram (structure shown in Fig. 4.1). In order to demonstrate how the data were coded, illustrative quotes relating to each element are presented in Table 4.3 for interns and Table 4.4 for tutors. As the analysis was completed, the data were mapped to the activity system diagram (Fig. 4.2). Each element is annotated with a letter to indicate its source. The letters (a-l) correspond with those in Table 4.2 above. Several components have multiple sources.

Table 4.2. Illustrative Examples of Text from Sources Used to Identify Intern Activity System Elements in Document Analysis

Subject: Interns		
Resource Name	Illustrative Comments	Element(s): Component(s)
a. Orientation day presentation	<p>Intern and Tutor</p> <ul style="list-style-type: none"> • Collaboratively review appraisal data • NB role of seeking feedback and importance of record-keeping • Good time to discuss any particular areas you feel you need to work on with your tutor 	<p>Community: Intern and tutor</p> <p>Division of Labour: collaboratively review data</p>
b. eLearning materials	<p>You are required to complete a number of self- and tutor- appraisals, and these are completed on Compass [Online lecture MPO.1 Introduction to the Programme, Aims, Assessment, and Attendance]</p> <p>Try and use it [the WBA process] formatively throughout the year as a formative diagnostic and developmental tool. Identify areas that you need to improve. [Online lecture; MPO.1 Introduction to the Programme, Aims, Assessment, and Attendance]</p> <p>Compass is a Moodle-based activity that allows you to appraise yourself and your tutor to appraise you against the competency framework using the rating scale. [Online lecture MPO.5; Completing Self and Tutor Assessments on the Virtual Learning Environment]</p>	<p>Rule: Complete appraisals</p> <p>Tool: Appraisal as a development tool</p> <p>Tool: Compass technology to support WBA</p>
c. Appraisal dates	Clinical (12 Month) Appraisal Number 1: Appraisal Opens 16th October 2015 Appraisal Closes 6th January 2016	Rule: Set appraisal dates
d. General announcements forum	<p>Dear Intern,</p> <p>The Compass Competency Rating System is now open on the VLE at the following link: https://vle.rcsi.ie/course/view.php?id=995</p> <p>Please note that that until you have completed and submitted your self-assessment appraisal, your tutor cannot complete their appraisal.</p> <p>Please find attached the compass appraisal phases dates for 2015/2016.</p> <p>Please do not hesitate to contact me if you have any questions.</p> <p>Kind regards,</p> <p>[Programme Coordinator]</p>	Division of Labour: Intern completes WBA first, followed by tutor

Subject: Interns

Resource Name	Illustrative Comments	Element(s): Component(s)
e. PSI (Education and Training) Rules 2008	<p>Completion of the in-service practical training programme 14.</p> <p>(1) Subject to the provisions of this Part, and for the purposes of Rule 5(b), a person who has been awarded a degree in pharmacy that has been recognised and approved by the Council in accordance with Part 3 shall complete in the State at least twelve months of an in-service practical training programme, under the direct supervision of a tutor pharmacist, in a registered retail pharmacy business or in the pharmaceutical department of a hospital if he or she wishes to apply under Part 5 to present for the Professional Registration Examination. Such in-service practical training programmes shall be subject to the prior approval of the Council.</p> <p>(2) Notwithstanding the provisions of paragraph (1), and in accordance with Rule 17, such a person may complete in the State a period of not less than 6 months practical training other than in a registered retail pharmacy business or the pharmaceutical department of a hospital with the prior approval of the Council, and always provided that at least 6 months of the required training shall have been conducted in a retail pharmacy business or in the pharmaceutical department of a hospital as provided for in paragraph (1).</p>	Rules: 12-month placement, at least 6 months in a clinical environment
f. Marks and standards for NPIP	<p>Workplace Assessment: This assessment involves online completion and submission of the appraisal of the competence standards appropriate to each of the modules MP1-MP6. Each student will be appraised against relevant competence standards a specified number of times based on their placement structure. This will be at least three times. However, only the final designated clinical summative appraisal in the competence standards will form part of the summative assessment of the student's competence.</p>	Rules: Minimum of three appraisals based on CCF; final appraisal only is summative

Table 4.3. Illustrative Examples of Text from Sources Used to Identify Tutor Activity System Elements in Document Analysis

Subject: Tutors		
Resource Name	Illustrative Comments	Element(s): Component(s)
g. Tutor handbook	<p>The tutor has a key responsibility for initiating and maintaining a suitable learning environment throughout the period of the intern’s training. This requires the provision of appropriate activities, opportunities and most importantly regular scheduled periods of protected time for both the tutor and the intern to discuss and review the training to date. It is important to realise that what is taught does not equate with what the intern learns. The teaching process is an interaction between the teacher (tutor), the learner (intern), the subject and the context.</p> <p>The tutor pharmacist plays a key role in the education and professional training of future cohorts of pharmacists, ensuring that such pharmacists at the point of registration with the Pharmaceutical Society of Ireland have the necessary knowledge, skills, attitudes and capability to practise safely and effectively in the best interests of their patients. In return for sharing their knowledge and expertise with interns, there are a number of benefits accruing from being a tutor pharmacist:</p> <ul style="list-style-type: none"> • Contributing to the continued growth and development of the pharmacy profession by actively participating in the formation of its future member • Diversifying and enhancing your professional skills by acting as a practice based educator. All pharmacy tutors are associate members of the Faculty of Medicine and Health Sciences at Royal College of Surgeons in Ireland and will receive a certificate confirming this • Strengthening and enhancing your practice • Maintaining, updating, and refreshing your knowledge <p>The conduct of the third and final assessment of an intern’s competency is a very important task for the tutor, not only because it contributes to the intern’s overall M.Pharm grade but because in accordance with the Rule 15(4) of the PSI (Education and Training) Rules 2008, the Council of the PSI is required to evaluate the performance of an intern by means including the assessment of the intern’s ability to apply the competencies set out by the PSI as being required to competently and independently practise pharmacy.</p>	<p>Division of Labour: Tutor to initiate and support learning activities</p> <p>Object: Professional fulfilment and development</p> <p>Rule: Sign-off at level 4 at final appraisal</p>
h. General announcements forum	<p>Practice Liaison Pharmacist: [name] can travel to visit students and tutors in the practice site. If you have any queries on any aspect of the Internship Programme, please do make contact [email] or at [mobile telephone]</p>	<p>Community: Practice liaison pharmacist</p>

Subject: Tutors

Resource Name	Illustrative Comments	Element(s): Component(s)
i. Appraisal dates	Clinical (12 Month) Appraisal Number 1: Appraisal Opens 16th October 2015 Appraisal Closes 6th January 2016	Rules: Appraisal Dates
j. Education and training rules	<p>Tutor pharmacists</p> <p>19. (1) A registered pharmacist practising as such who— (a) has practised as a pharmacist for a minimum of 3 years with a minimum of 1 years’ experience in the field of pharmacy practice in which he or she intends to act as a tutor pharmacist, (b) has completed such programmes of education and training as may be set down by the Council from time to time, and (c) meets the standard of knowledge, skills and experience as may be required by the Council from time to time for such pharmacists, may be recognised by the Council with a view to acting as a tutor pharmacist under these Rules.</p>	Community: Tutor pharmacist criteria
k. eLearning materials	<p>Coaching is the art of improving the performance of others. Coaches demonstrate skills by encouraging people to learn from and be challenged by their work. It is a life skill for a tutor</p> <p>“The objective of performance management is to help the individual improve their performance, realise their potential and achieve better results for the organisation</p>	<p>Tool: Tutor skills in coaching</p> <p>Tool: Performance management skills</p>
l. Tutor training day slides	<p>What is Compass</p> <ul style="list-style-type: none"> • A Moodle based activity that enables <ul style="list-style-type: none"> ○ Intern completing a self-assessment against the CCF ○ Tutor completing assessment of their assigned student(s) against the CCF” <p>Setting the Scene</p> <ul style="list-style-type: none"> • Coaching provides the process that helps people get better, thereby facilitating goal achievement • Every tutor has the potential to become an effective coach if they want to • Good coaches demonstrate their power as a motivator, communicator & facilitator of change 	<p>Tool: Compass technology</p> <p>Tool: Coaching skills</p>

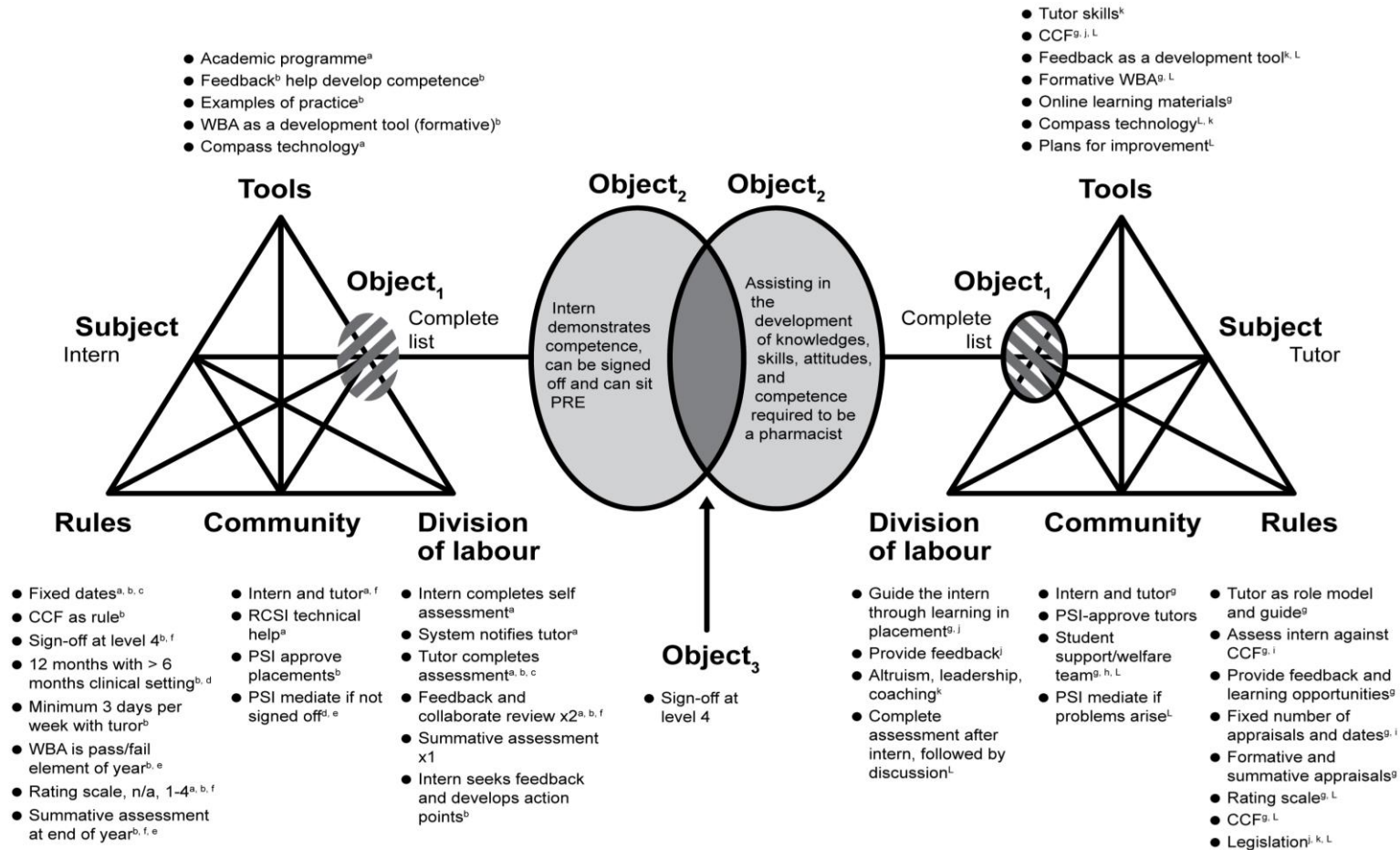


Figure 4.2. Document Analysis Findings Mapped to an Activity System: Components identified during the document analysis mapped onto the activity system elements to model an activity system (unit of analysis).

4.3.3 Document Analysis Findings

The document analysis findings are represented as activity system with elements derived from the training materials. Therefore Fig. 4.2 contributes to building a representation of what practice *should* be. When using activity theory, the structure itself is not a standalone finding as activity systems should be considered as dynamic, evolving structures (Engeström, 2014, p. xxviii). Therefore, in the paragraphs below, the relationships between the elements are considered further to reflect this, first from the perspective of interns, then from the perspective of tutors.

From the perspective of an intern learning about WBA it is clear that the practice is complex, consisting of multiple interrelated components. However, descriptions of this practice and these components is scattered across a number of documents. The findings presented in Fig. 4.2 suggest that according to the document analysis during WBA, interns (*subject*) ultimately work towards being rated at Level 4 on the complete list of competencies so that they can proceed to the professional registration exam (*object*). They need various resources to do this; including WBA with tutor feedback completed using Compass and the CCF. They use examples of their own practice to provide evidence of their progress during WBA review meetings, and draw on the content of the modules being completed alongside their placement for guidance (*tools*). They complete the WBA with or in accordance with the requirements of others including their tutor, PSI and RCSI administrative, academic, and student welfare staff (*community*) to achieve their goal. How they work with others is influenced by several requirements including regulations (e.g. the kinds of placements permitted under legislation, requirements for working with their tutor three days per week, being rated at Level 4), specified intervals for WBA, the CCF, and the rating scale (*rules*). Several people contribute towards the completing the WBA, completing

various tasks. Interns self-assess using Compass, which then prompts the tutor to complete their assessment. A review meeting is arranged to facilitate collaborative review and feedback. The intern should seek feedback and develop action points (*division of labour*).

From the perspective of a tutor learning about the WBA practice, the analysis showed that WBA appears similarly complex, with details about various elements also spread across a number of materials. The tutor's (*subject*) goal should be to assist their intern develop the knowledge, skills, attitudes, and competence required of a qualified pharmacist so that they are eligible for rating of Level 4 on the complete list of competencies (*object*). They use several resources to achieve this including the CCF, the training materials (online and face-to-face), skills (leadership, communication, delegation, emotional intelligence, coaching), feedback, Compass, and plans for intern development (*tools*). They work with others including RCSI staff (academic and support), and the PSI (for initial tutor approval and mediation if required at the end of the placement) and their intern (*community*). How they work together, is influenced by the designated role of the tutor as a role model and guide who provides learning opportunities to the intern, completes WBA and provides feedback. This is done using the CCF for formative and summative assessments at fixed intervals using the defined rating scale in line with relevant legislative requirements (*rules*). This is achieved through the tutor acting as a guide for the intern, providing leadership, and coaching. For the WBA, the intern self-assesses followed by the tutor assessment and discussion at a review meeting (*division of labour*).

4.3.4 Document Analysis Strengths and Limitations

Document analysis is considered to have several strengths as a method, including efficiency, availability of material to be studied, cost-effectiveness, lack of obtrusiveness, stability, and broad coverage (Bowen, 2009). These strengths made it particularly useful in this part of the research. It facilitated gathering information from the perspective of the intern and tutor as activity system subjects, and revealed elements and challenges that may have been otherwise overlooked, for example the complexity of the WBA practice, and the fact that this information is spread across a number of disparate documents. It also helped establish how all the elements should work together to frame WBA practice.

From a methodological perspective Bowen (2009, pp. 31-32) identifies a number of ‘potential flaws rather than major disadvantages’ of document analysis. The first is that the approach may rely on documents available containing *insufficient detail*. In order to overcome this, another method will be used to build upon, and triangulate the document analysis findings. The second is that the documents in question may have *low retrievability* and access to certain materials may be impossible or even blocked. In this research, this is not a significant issue in terms of access to the online documents, but as the presentations given at the tutor training and intern induction were not audio- or video-recorded, only the PowerPoint slides were used in the analysis. As many of the documents are available only on the VLE, which can only be accessed by those registered on the course or staff, comprehensive, indicative extracts are provided (Tables 4.2 and 4.3) to make the coding as transparent as possible. The third limitation relates to the potential for *biased selectivity* relating to an incomplete set of documents being analysed. In this research, all materials that are made available to interns and tutors were included in the analysis to avoid this possibility.

From a theoretical perspective, the limitation of this method relates to contradictions. Contradictions are one of the core principles of activity theory according to Engeström (2001) (see section 3.6.2.3). Using document analysis, it was not possible to identify any contradictions, as the documents presented WBA as it *should* be done. Therefore, the document analysis method alone was not sufficient to explore actual practice and its strengths and limitations and is therefore combined with another method below.

4.3.5 Summary of Document Analysis

Using the document analysis method allowed a comprehensive study of what practice should be according to the training materials from the perspective of interns and tutors through the lens of the materials presented to them for training purposes. Nicolini (2012, p. 227) states “methods for accomplishing practice, its orientation, and normative force, need to be learned”, and therefore this document analysis facilitated insight into this process. The findings show that WBA practice appears to be more complex than first described in Chapter 2, involving multiple interrelated elements. Using the activity system structure as a framework facilitated the analysis of the data allowed the generation of a normative activity system that represents what WBA practice should be. As the objective of this chapter is to identify what practice is to facilitate the study of the Visualisation Tool, the next step involved gathering data that reflected actual practice. How focus groups were used to achieve this is described in the following sections.

4.4 Focus Groups

The next step towards developing an activity system representative of WBA practices was to gather data relating to participants’ experiences. This required exploration of

various participants' experiences (multivoicedness) in the competence assessment process to gain insight into the history of change (historicity), problems or tensions (contradictions) manifesting in the system and how they were overcome (expansive learning). Focus groups with recent interns and current tutors were identified as an appropriate qualitative method to gather this data.

4.4.1 Focus Group Method and Theoretical Considerations

Focus groups are based on the principle that an individual's contribution and understanding is enhanced by a group dynamic, and a collective view is obtained (Smithson, 2000, p. 105). This allows the opportunity to gather direct evidence about the participants' similarities and differences (Cousin, 2009, p. 52). Focus groups are considered compatible with activity theory (Yamagata-Lynch, 2010), and in this case were particularly relevant in gathering information on experiences from several participants. Gathering data relating to experiences' of many participants reflects the activity theory principle of multivoicedness. The data collected could then serve a dual purpose; first to triangulate the findings from the document analysis, and second to provide further information about the WBA practice which was not available from the document analysis.

4.4.2 Participants and Procedures

4.4.2.1 *Participants*

Several factors were considered when planning the composition of the focus groups. Group dynamic factors (e.g. perceived social power based on intern versus tutor perspectives) could potentially influence the full disclosure of experiences. Therefore, separate focus groups with interns and tutors were planned initially, with the option to

arrange a third with a combination of interns and tutors if this was required for clarification or discussion of discordant views.

Interns who had completed their exams but had not yet registered as pharmacists (i.e. had completed the formal programme and were awaiting graduation and registration with the regulator) were identified as the best representatives for the intern focus group. This meant that they had complete and recent experience of WBA, so their accounts should be reliable. The fact that they had fully completed the NPIP meant that I could moderate the focus groups, as I was no longer in position of relative power as all teaching and assessment was completed. Tutor pharmacists generally took interns on an annual basis, so the current (2015-2016), and immediately preceding (2014-2015) cohorts of tutors were identified as an appropriate group from which to invite participants. As the tutors are all qualified pharmacists there was no concern about the power dynamic in this group.

Issues also considered when planning were the dynamics of focus groups in general include number of participants (Cohen, 2011, p. 437), interpersonal factors (e.g. gender, ethnicity, age), intrapersonal factors (participant disposition and self-management) and environmental factors, including décor and seating, and layout (Cousin, 2009, pp. 55-56). In the case of this research, another factor considered was that the ideal composition of the focus groups would reflect the varying kinds of placements possible in the NPIP (community pharmacy, hospital pharmacy, and non-clinical placements) to ensure sufficient diversity to capture a range of views about the competence assessment experience (multi-voicedness). Notwithstanding these factors, issues of feasibility including the reliance on volunteers meant that a pragmatic approach to optimising these factors would be required.

4.4.2.2 *Ethical Considerations and Participant Recruitment*

As the research would involve the recording of participants, ethical approval was sought from Lancaster University. Email invitations were sent to the entire email distribution lists for the relevant groups in October 2015. The email contained the participant information sheets for the focus group study (Appendix A), and requested that recipients respond if they were interested in taking part. Two initial focus groups were arranged, the first with interns only, and the second with tutors only. Both groups consisted of men and women, representing all of the possible placement types.

4.4.2.3 *Physical Environment*

The environment chosen for the focus group was considered carefully, as well as the layout of the room. A private conference room in the pharmacy faculty offices was used, and set up as seen in Fig. 4.3 and Fig. 4.4 below to facilitate maximal discussion, visibility of the computer screen and whiteboard where information was displayed and collected during the focus groups. Recording devices were placed so that they would remain unobtrusive, but reliably record the discussions. An Olympus® VN-732PC digital voice recorder was used to record audio, and a GoPro Hero4 Silver®, and a Canon LegriaHF R606® camcorder to capture any writing on the whiteboard in the room and serve as back-up devices in case of audio failure. These devices were chosen, as they were small, and could be positioned in the room out of the line of sight of the participants.

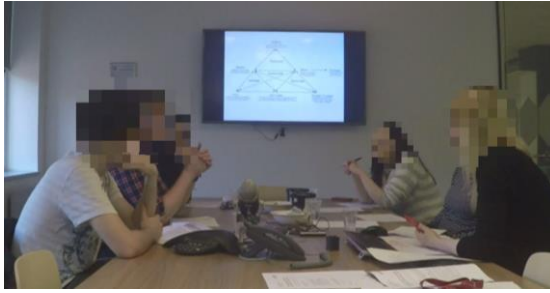


Figure 4.3. Intern Focus Group



Figure 4.4. Tutor Focus Group

4.4.2.4 *Focus Group Procedures*

In order to maintain a consistent approach and to ensure the aims of the focus group were met, an activity sheet was provided for each participant to serve as a guide for the focus group, with corresponding slides shown on the screen (see Fig. 4.3) for the purposes of explaining key concepts. Each focus group followed the same format, introductions and establishment of ‘ground-rules’, followed by a warm-up exercise where participants were asked to generally describe their experiences, before moving on to explaining the activity system using definitions provided on the worksheets. The activity system was used to structure the focus group discussions. A discussion of each element individually was completed initially, before moving on to explaining, identifying and exploring systemic contradictions.

4.4.3 Data Analysis and Findings

The audio files were fully transcribed verbatim and any text that would have enabled identification of the participants or their placements was removed. The same deductive coding framework as for the document analysis (Section 4.3.2) was used, with categories based on the activity system elements. Identifying contradictions is known to be methodologically challenging, but as contradictions represent one of the key principles of activity theory, doing so accurately is important. The approach described Engeström and Sannino (2011) to identify contradictions was used to identify contradictions from

the focus group discussions. Variations from the normal scripted course of events (disturbances), expressions of hedges and hesitations (dilemmas), instances of resistance, disagreements, or criticism (conflicts), or evidence of participants facing pressing and equally unacceptable alternatives (double-bind) were identified as contradictions (Engeström & Sannino, 2011, pp. 372-375). They were then classified according to Engeström (2014, p. 71) four categories (primary, secondary, tertiary, and quaternary of contradiction). Text that indicated that the participants had made efforts to overcome the contradictions (i.e. examples of expansive transformations in the system) were also identified. In the sections below, the key findings are presented, firstly from the intern focus group, followed by the findings from the tutor focus group. The findings are then discussed.

4.4.3.1 *Intern Focus Group*

The intern focus group took place on October 16th 2015 and comprised of five interns, representing all areas of practice (community, hospital, and non-clinical), including split placements, where interns spend six months in two training establishments. The focus group lasted for 1 hour and 15 minutes.

Subject

The subject was predetermined by the unit of analysis for this study. The meaning of ‘subject’ from an activity theory perspective was explained to the participants, and they were asked to ensure that they were responding to questions from their experiences as interns and to provide concrete examples whenever possible.

Object

Interns were asked about what they were trying to achieve when completing the WBA. They identified the object of the activity system, as being to guide themselves

and their tutor towards competence development and sign-off at the end of the training period.

It's to see how [interns] are getting on, to give a start and an end, where they are and where they need to get to, and again to get [interns] to flag problems they are having before they become ones that are detrimental. Then just basically areas where they can improve upon.

Object definition

And then it felt that you know that you're in a kind of journey and how far along you are, but also then you choose what mark you gave your confidence and that an actual qualified pharmacist would see all this and you're getting better and getting towards it. It did help in knowing where you were and it kind of felt like, yes, I am getting to the standard required to be a practicing pharmacist.

Object: Facilitate and monitor progress

When participants were asked to describe their experiences of WBA in their own placements, it became clear that while the object of interns completing the WBA, getting feedback and planning their development is achieved in most cases, there were variations in experiences. Most participants found the WBA useful, and highlighted the benefits of the discussion with their tutor when it had taken place.

I would say it was constructive and I knew what to do and what I had to improve, and even things I would have, again, marked myself lower and she would have said 'Why are you putting yourself that?' So I think from that point of view they were constructive.

Object achieved

However, others felt that it became more like a 'tick-box' exercise where the tutor had demonstrated limited engagement. This kind of mixed response is also reported with medical trainees and may relate to issues with assessor engagement and assessment design (Bindal, Wall, & Goodyear, 2011). These experiences were coded as contradictions.

I think that it is looked at by the tutor as more binary than it should be so at the end they can just kind of go ‘Are they good enough? Are they okay? Yes, no?’ And if it’s yes, all the competencies get four, I think they can be viewed in those eyes.	Primary contradiction within rule (i)
It is just kind of like, this person is going to give me a four anyway...so...it’s kind of like maybe there are other things I could have improved on...but you don’t know.	Secondary contradiction: Rules vs object (ii)

Tools

Participants were asked to describe the tools that they used when they were completing the WBA. They described using a number of tools, including printed materials, compass software, notebooks, examples, and time. While many reflected those identified in the document analysis, and the participants’ descriptions provided clarity on how they are used in practice, several new tools were also identified. Similarly, several tools identified from the document analysis were not explicitly mentioned by the interns. It was also apparent that multiple tools were used concurrently during the learning experience.

I needed to brush up on my clinical skills, so we used to go through the BNF together and go over my clinical stuff.	Tool: Books
I had a book, so if I didn’t know something it got written into the book...if the word Tylex is written down that’s one thing but after seeing and handling it, it helps you remember better. So myself I took a picture of every box of everything I saw, and I looked it up in the BNF, indication, whatever and put it on a word file and then put it on to my laptop or my iPad so I have a small mini-dispensary on it.	Tool: Own notes
I had a printout, she was able to read through them...but I think my placement was a little different because we have separate training days and those training books were a good guide, she also uses them as a guide for things she knew she needed to go through with that. From that point of view, I suppose I was lucky, I had a different, it was a different type of placement.	Tool: Placement-specific training materials
I would have had the PSI guidance printed out.	Tool: printed materials
I did all of mine out on paper and it was easier just to go this is whatever two, three, four, one, two, whatever.	

I guess going through the list of competencies and what you decided. I decided upon self-reflection, did I do that correctly, did I feel confident and comfortable doing that, and if so that was a four, and if not that identified ones that I need to do better in and address.

Tool: Core competency framework

It's like four for excellent, and one for oh my God I'm useless.

Yeah, I probably looked at things that were at the lower end first, like okay, that's quite bad and I need to work on that, and then anything that your tutor had given you a four and you go maybe I'm better at that than I think, or I don't need to worry about that so much. So there is a lot to think about at once, but I suppose you are looking for discrepancies and anything that's not very good and not getting where it needs to be.

Tool: Rating scale

At certain points, it was unclear as to how the tools to which the participants referred were used as part of their WBA practice. The interns clarified as follows.

I think in my second particularly in my second pharmacy it was like, 'oh that's how you learn, that's brilliant if you need anything let us know'. They were happy to see that I was working away and learning, and that I was happy doing something and they were happy to help me out too.

Clarification on use of tools forming part of WBA

They would have seen me making notes and stuff. I don't know if I used it explicitly like when I was doing the appraisal, but it was more of a long-term development.

Clarification on use of tools *not* forming part of WBA

The interns initially appeared to feel more comfortable discussing more tangible tools but then moved on to discussing other tools including examples, feedback, and time.

I suppose examples is what I would have used.

I would have looked through [the list of competencies] and I would have gone through that and tried to think of examples for myself. Like does this example reflect that competency? That's how I would have gone through it...I went through a day for examples and this is how I feel.

Tools: Examples of practice

I would try like think of examples and then try and visualise how confident I would be if that scenario happened again, and that would be the rating I would give myself.

I'd be like, can you give me feedback, tell me how I'm doing. That would give me an idea of how to grade myself.

Tools:
Feedback

Time was considered a key resource drawn upon by the interns during their WBA, with the amount of time required varying across the appraisal over the course of the year. Most time was needed for the first appraisal.

So you needed time. I suppose we were lucky that we had just a few days where we had double-cover. So there was two hours' double-cover so we were able to use that time effectively and then go through it.

The first one always took the longest, I filled mine my first week here, and then my tutor and I, when he was going through it, he would go 'How do you think you got this for this one?'

Second appraisal we probably wouldn't have spent as much time going through it because we've already gone through it, but the only difference would have been that, I suppose we wouldn't have taken as long and there were some ones that I would have just said "well this is why I gave myself a two or three in this". We would have discussed it from that point of view, but the second appraisal....it wouldn't have taken as long because I was more familiar with her.

Tools: Time

As with the object, the interns described problems relating to tools arising during their experience, and these are represented as contradictions. Importantly for this thesis, several relate to Compass and the role of technology in the WBA.

[Compass] I found when I went to the computer and you clicked the question mark [to show the full behavioural description], sometimes the information just disappeared too quickly by the time you finished reading it. So that's why I printed it out.

Once or twice it [Compass] would lock out. So that was one thing, when you have so many things it might be handy if there was an option for your last one, if the tutor knew you were consistent they could just go four for everything and we would go through.

Primary contradiction within tool with [suggested] developments (iii)

Like if you set aside time, and sometimes it doesn't always but it is a busy pharmacy so it doesn't always go to plan so from that point yeah we would've had issues with that and I think my last one was delayed because we didn't get the time because we were so busy and short-staffed that we just didn't have time to sit down to do it.

Quaternary contradiction: WBA vs general workplace activity system (iv)

I think also having the thesis due the same day and it being again, we were just incredibly short-staffed and I was doing a lot of late nights and I was at work trying to remember to put the alarm on, so it was difficult.

Quaternary contradiction: WBA vs academic programme (v)

Community

Interns were asked to describe who was involved in the WBA from their experience. It became apparent that the role of others apart from the intern and tutor varied from quite extensive to very limited depending on the placement, and that this is underestimated in the normative model. While this varied depending on the placement type, all interns and tutors made reference to the role of others in the competence assessment.

Other pharmacists you work with, and then when you are grading yourself, you'd be talking to your classmates.

Community: other pharmacists/classmates

I would have also gone to other staff, the store manager and I would've asked 'where do you think I need to improve?'. I would have done that.

Community: Non-pharmacist staff

When I went to the community pharmacy because it was one that just was small enough that one pharmacist could manage, it ended up being predominantly that one pharmacist could manage, it ended up being that predominantly there that she wanted me with her at all times to help her, that she became the centre of any input or feedback. And again with my last place it was more because of multiple pharmacists there they contributed a little part to it, so it depended on each person's individual setting, how many people fed into your own assessment of yourself and your tutor's assessment of you.

Community: Varied depending on particular placement

Division of Labour

The division of labour relating to the WBA system is influenced by the rules pertaining to the competence assessment process. As outlined in Chapter 2, the system requires the intern to first complete their own self-assessment before the tutor can complete theirs. The discussions at the focus groups reflected this

I felt when I was in it was just me and my tutor, I didn't think in terms of the assessments anyway it was, obviously you get more informal feedback and stuff from other people you are working with, but I know my tutor would have set aside time to go and do the thing themselves. So they weren't standing around going what do you think, and you know, again, when I was doing my own I just sat down with the list and just went "Okay how am I doing on this, can I think of any examples, can I think of what I'm doing well or doing badly?" so I didn't feel like there was much involvement from anyone else.

Division of labour:
Intern and tutor only

Contradictions were identified by the interns also, who highlighted that the rules or norms within their individual placements sometimes created difficulty with their learning and WBA. In other cases, several pharmacists, including the tutor, adopted a collective approach to the intern's WBA. Issues of power were also raised with interns all feeling they had much less power than their tutor.

I was happy to do whatever anyone asked me to do, but I feel there was something a bit more powerful, whose authority was for where...and I get the feeling you end up having to take sides and I ended up having to go with my tutor just for the repercussions of it.

In my community pharmacy where the pharmacists had overall responsibility and they had overall control of the situation but it was far more of a team group effort...If you went to counsel someone that's okay...It was far more shared responsibility.

The final say is theirs, she would say to me 'ultimately I am signing you off if I am happy then, because you will know if I'm not happy, I'll let you know, don't worry'.

Primary contradiction:
Division of labour (vi)

Rules

Interns were then asked to describe the rules or guidelines they were following as part of the competence assessment process. They identified rules arising from three primary sources the regulatory requirements, the academic programme and local institutional policy in their placements. In most cases, the interns reported following the guidance set out in the WBA where the intern self-assessed, the tutor reviewed the self-assessment and completed their own assessment, and then a meeting was arranged to discuss progress in line with the schedule set out by the programme coordinator.

Obviously I had the SOPs in the pharmacy. You follow the structured guidance set down by the pharmacist.	Rules: Local policy
You have to give between a one and a four going okay so you're confident half the time, or confident 85% of the time, that was used to cut off how well. So if you felt very confident that you're like above the 90s or something. If most of the time you're on a two or three or four, and if you need help on not very much, probably a two.	Rules: Rating scale (1-4)
Yeah I submitted mine, and then she was doing that and she was looking at my results and she'd be like, 'I scored you lower because...' or 'I scored you higher, why are you marking yourself lower?' and we discussed that. It was just like that.	Rules: Review meeting

Some interns indicated that rules had a significant impact on their practices. They were sometimes associated with problems. For example, some interns noted that they felt obliged to model the behaviour of their tutor. The set timing of the WBAs led to issues with achieving the object, and for some, the CCF being the rule for what behaviours must be demonstrated led to challenges in achieving the object as many elements did not apply in certain placement types.

Where there is any kind of grey area that you are brought into, you ended up mimicking the behaviour of your tutor, what they would do and you get to know near the end that other pharmacists, they on the day that they would do that you do for them if they're in charge. But if your tutor was there you'd be doing what you're the tutor, how they would have done it. Both may be perfectly right to do, but one would have been a preference of how you would do your own at the situation.

I kind of felt when you weren't in a community placement, that it just felt a bit arbitrary in a way...that you more had to do it and it wasn't relevant for where you were...It only became applicable when you were in community.

I found it very difficult to do because there was huge chunks that are not applicable, so you're there scrolling down going, can't do that, can't do that', and that's a little bit disheartening as well, you looking at a whole big list of things going, 'I have no idea what any of this is about'.

Tertiary contradiction: Pre-NPIP, no WBA was required and only requirement was to keep tutor happy (vii)

Secondary contradiction: Tools vs object (viii)

Summary

The focus group with the interns provided the opportunity to triangulate the findings from the document analysis, and elucidate contradictions based on the experiences of the participants. This is represented in Fig. 4.5 and the analysis and findings are discussed later in section 4.5.

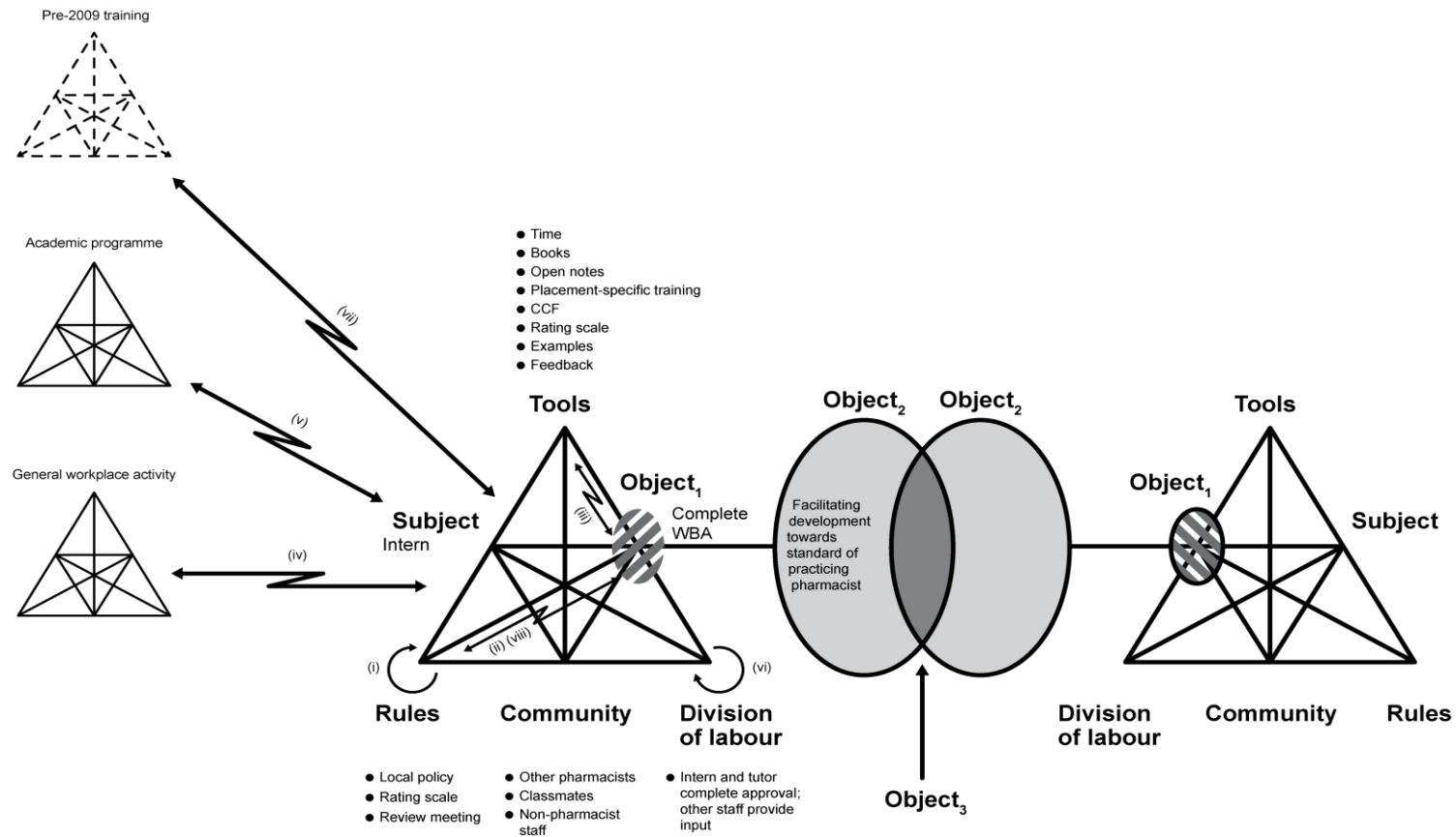


Figure 4.5. Activity System with Data from the Intern Focus Group. The data from the intern focus group are mapped to the activity system (unit of analysis).

4.4.3.2 *Tutor Focus Group*

The tutor focus group took place on January 12th 2016 and had four participants of the six initially recruited present (due to extremely adverse weather conditions), with tutors from all placement types (community, hospital and non-clinical) represented. Despite the cancellation of two participants, the focus group proceeded as scheduled as four participants are considered sufficient for a focus group (Cousin, 2009, p.60), and all placement types remained represented. The focus group lasted 1 hour and 20 minutes.

Subject

The meaning of ‘subject’ from an activity theory perspective was explained, and participants were asked respond to questions about the other elements from their experiences and provide examples where possible.

Object

An activity theory definition of the term object was provided to the participants and they were asked to consider how it reflected their experience. Their response overlapped with the interns’ definition, relating to a desire to be in a position to ‘sign-off’ an intern as being competent. One tutor suggested that it was slightly more than that, with the object being to sign them off, but also for their training to have them at a level where they could become a colleague should a suitable position arise.

I think that by the end you’re happy to sign them off and that you’re confident they can become a competent pharmacist.

Object: Sign-off as competent

You want to be able to hire them...if you have a position coming up you can hire them without having too much training because you have invested in them...you want someone you’d be happy to hire.

Object: Sign-off at a level suitable for hire

Community

The tutors were next asked to consider who were involved in the WBA from the perspective of the tutors. As with the interns, several others were identified as the tutors described their practices.

Pharmacist colleagues, but also the technicians. The technicians are people who are very aware of their [intern's] performance.	Community: Technicians
Patients; all along certain tasks are delegated to the intern like counselling, and you check back in, that was an intern pharmacist, so were you happy with the information for the questions, so it's kind of an informal way of checking up on them. Then I might ask the patient or parent some questions and make sure, and if they can answer them, I know they have been disseminated the information and they can.	Community: Patients
The NPIP team, so like yourself [the role is] supportive, I suppose we feel that if we need to check anything or get in touch if there are problems or issues or if we foresee any problems arising before time, you know you can see it in advance.	Community: RCSI staff
I have people in my team who would give feedback to me...if projects come up...and you will send up an intern...then we get feedback from the people they work with.	Community: Others who work with the intern
They [interns] all talk to each other. Yeah they all talk. What's your tutor doing with you? We've had issues because we take two interns where one would get to do clinical work sooner, and that can cause 'Why am I stuck here?'. They will get the same amount of time, but there can be a little bit of friction.	Community: Peers

Division of Labour

The next element considered was how the various members of the community worked together to achieve the object of the activity. This was explained in terms of the role of the intern and tutor, but also in terms of others in the community identified.

Similarly to the interns, the tutors explained that they adhered to the overall process of intern completes their self-assessment followed by the tutor completing theirs, but a lot of the discussion focussed around how involving others in the process affected it.

“I suppose the real tricky thing we had for the first few years was when people didn’t understand why they’re here, what they are doing here, and what their qualification was...Like who are these people, they come in, are just trained and then they just kind of leave. But once they understand there is buy-in...then all of a sudden there’s an appreciation for their ability and I think then everyone can start contributing and people start to volunteer to take them to do work within their sections, but it has to be built over time.

Tertiary contradiction: Having no intern vs being a training environment (ix)

“I’ve found there is sometimes resentment from other staff and not pharmacist staff. “Why are these people getting all these opportunities? And I’m doing the type of work they are doing. It used to be my work and how interns are going to this.” If it’s not managed well, that can affect the interns and how they progress, I think this [hospital] can be a challenging environment. I’ve seen it in community as well, interns with an inflated idea of what they are there to do and really rub people up the wrong way all together, you know, in shops [community]”.

Secondary contradiction: community vs division of labour (x)

“I’ve wondered before about people not being aware, you know, is she a pharmacist, is she not a pharmacist, what can she do or can’t she do. So we have put together a sheet.”

Example of potential for expansive learning (xi)

Rules

Tutors were invited to discuss the rules and norms that they adhere to as part of their role in the WBA practice and they identified the following rules.

I expect improvement and development [across the appraisals] ...confidence in dealing with others and patients that you might not see so much to begin with. I always ask for in my intern in community is an excellent OTC assistant, an excellent technician and an excellent pharmacist.

Rule: Development over time

Yeah that [having no structure] would be more like looking for alarm bells for things that are going wrong rather than, you’d see what they are doing well at but probably wouldn’t be thinking as much about how good they are at this. If you’re thinking there is an issue here in terms of maybe answering the phone, giving out information they shouldn’t be giving. So it could almost be a negative experience then if you’re you know, looking for faults in terms of feeding back, rather than being able to be aware of all the things that are going well and being able to put a structure on it.

Rule: Defined structure of WBA (has benefits)

The tutors then identified some contradictions arising from their WBA practice, and these primarily related to the rules regarding the rating scale.

I think if the [aim of the practice] is four, four, four, four we can achieve this, but if the outcome is a really useful reflective review of their practice and a genuine score...So if like 170 people shouldn't all have the exact same score in the CCF, it just doesn't make sense, that shouldn't happen. So where the rules are set and the outcome is set, we have to get from here to there. By doing all these things, but we know we have to follow the rules and we have to end up at fours, so what happens in between doesn't really matter, because you start with the rules and get to fours.

Secondary contradiction:
Rules vs object
(xii)

What if you have an intern who is an excellent communicator, and form maybe their clinical knowledge, they do need to work on it, but it's good enough, but it could be better. That's a four as well and you know, could go vice versa. So yeah, it just doesn't reflect that. Yes, everything has to be at a certain standard, but then some things might be...

Secondary contradiction:
Rules vs object
(xii)

The discussion continued with the participants suggesting that there should be room for interns to demonstrate excellence, and a more realistic variation in levels of competence, indicating examples of potential for expansive learning. One participant proposed an option, where interns are assessed on a five-point scale (fail, borderline, clear pass, good, excellent) that could allow interns to pass, but also highlight behaviour that went above the minimum pass level. The other participants agreed that this would be beneficial, suggesting that it would allow the candidate to move beyond competent as a goal, and facilitate reflection and professional development.

It would help balance feedback in terms of saying you're excellent at this and you really need to work on that...You know, you're at a level you can pass, but you could be at this level and that's just all you need to focus on.

Suggested benefit for new approach:
expansive learning (xiii)

Tools

The tutors were then asked to discuss any tools they use as part of their WBA processes, and provided a number of examples, some that had been identified in the document analysis, and others that had not.

The communications lecture that we get at tutor training...always spring to mind especially if you are giving negative feedback...and how to give it in the best way.	Tool: Training materials
They've made a huge difference...like how do you structure that, the conversation	
We have a working system that tracks and logs everything, I can see any email the intern sent, so I use that to set objectives and be easy to assess how many cases completed...It's a crude measure, but you can actually see.	Tool: Local systems
Usually I would go through their areas to improve on and these are things you can do between now and your next appraisal in order to address this, so kind of have a plan in place.	Tool: Plans
I usually look for evidence of something, for example dealt with a query or difficult prescription, kind of checking, developing a routine for checking and checking logs and things like that. Just kind of extra tools to help focus and discussion.	Tools: Examples
Time is such a big thing.	Tools: Time

The tutors also provided examples of contradictions relating to the tools.

You have ideas and plans and set aside time then you get an urgent query from ICU. The time management aspect of it is very difficult.	Quaternary contradiction: Time vs work requirements (xiv)
[Compass is] cumbersome, just the drop-down menus, having to focus on all, took a lot of time. It's very hard, like I'm sure if you did an analysis across all interns their scores in MP6, by the time they get there they just give up.	Secondary contradiction: Tools vs object (xv)

Well to be honest, out of the 144 (sic) I think there's just so many. We did an exercise about two years ago here we got all the tutors together and we just had a spreadsheet of all the core competencies and we matched the behaviours described in the core competencies to what the actual day job of the intern was within our section.

Secondary contradiction: Tool vs object leading to expansive learning (xvi)

Summary

The focus group with the tutors provided the opportunity to triangulate the findings from the document analysis, and add further elements and contradictions based on the experiences of the participants. This findings are mapped to the activity system in Fig. 4.6 below and the analysis and findings are discussed below in section 4.5.

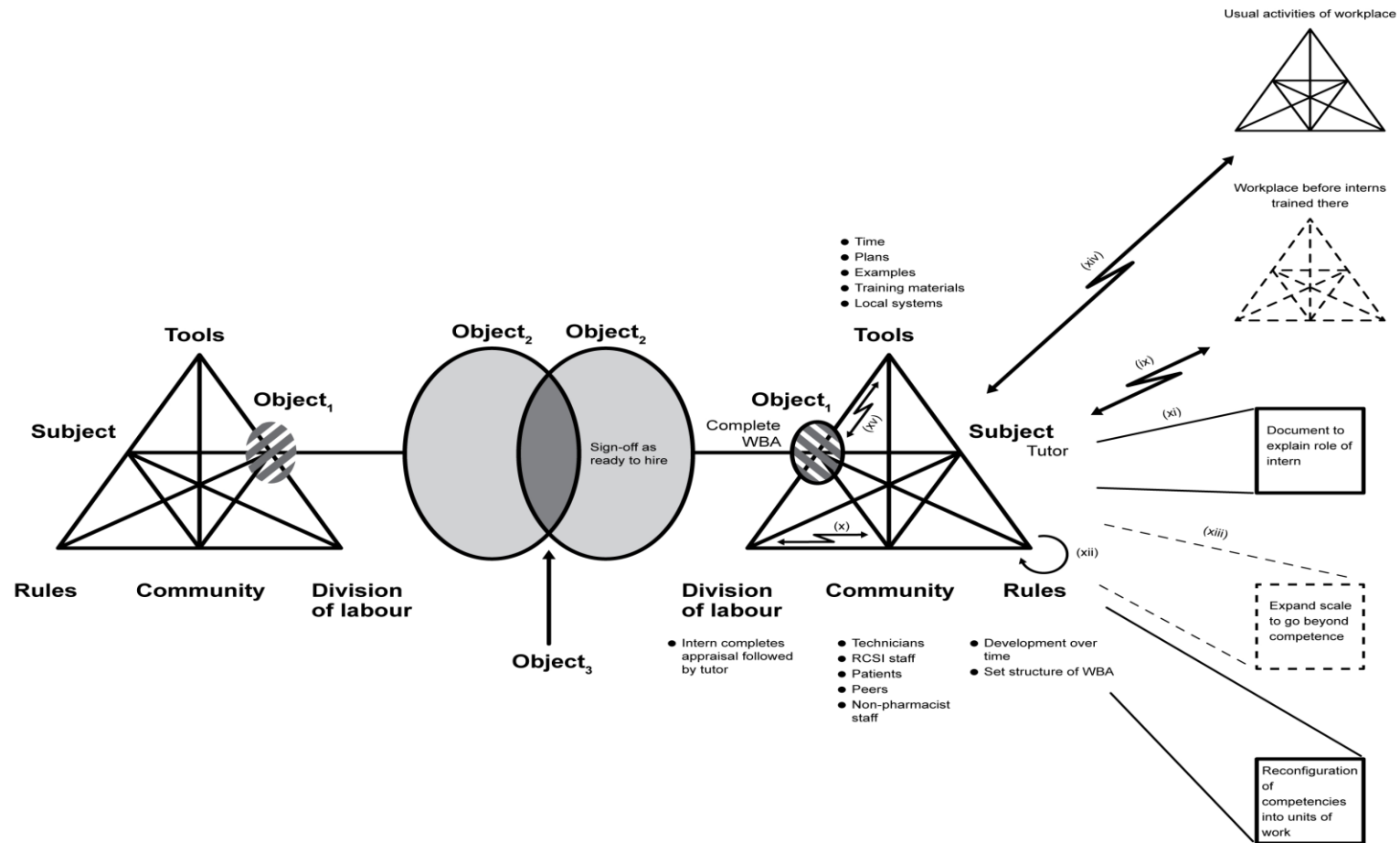


Figure 4.6. Activity System with Data from the Tutor Focus Group. The data from the intern focus group are mapped to the activity system (unit of analysis).

4.4.3.3 *Summary of Focus Groups*

The focus groups enabled data relating to intern and tutor experiences to be gathered. From a method perspective, participants engaged well during the focus groups, and there were no issues relating to issues of dominant voices and normative discourse which can be a concern (Smithson, 2000). Participants disagreed with each other several times and offered varying perspectives, for example, “I don’t know if I quite agree...” (intern participant) indicating that they felt comfortable to speak.

Participants raised several problems that they encountered and reported practices that were not in line with regulations to some extent, so the ‘tendency for certain types of socially acceptable opinion to emerge’ was avoided (Smithson, 2000, p. 116).

From a theoretical perspective, the participants were willing to work with the activity system terminology using the definitions provided without difficulty. The focus groups transcripts were analysed using a deductive framework based on the work of Engeström (2001) and his principles of contradictions. The findings were mapped initially to the relevant parts of the activity system, but are combined in Fig. 4.7 below where all findings are mapped to the activity system.

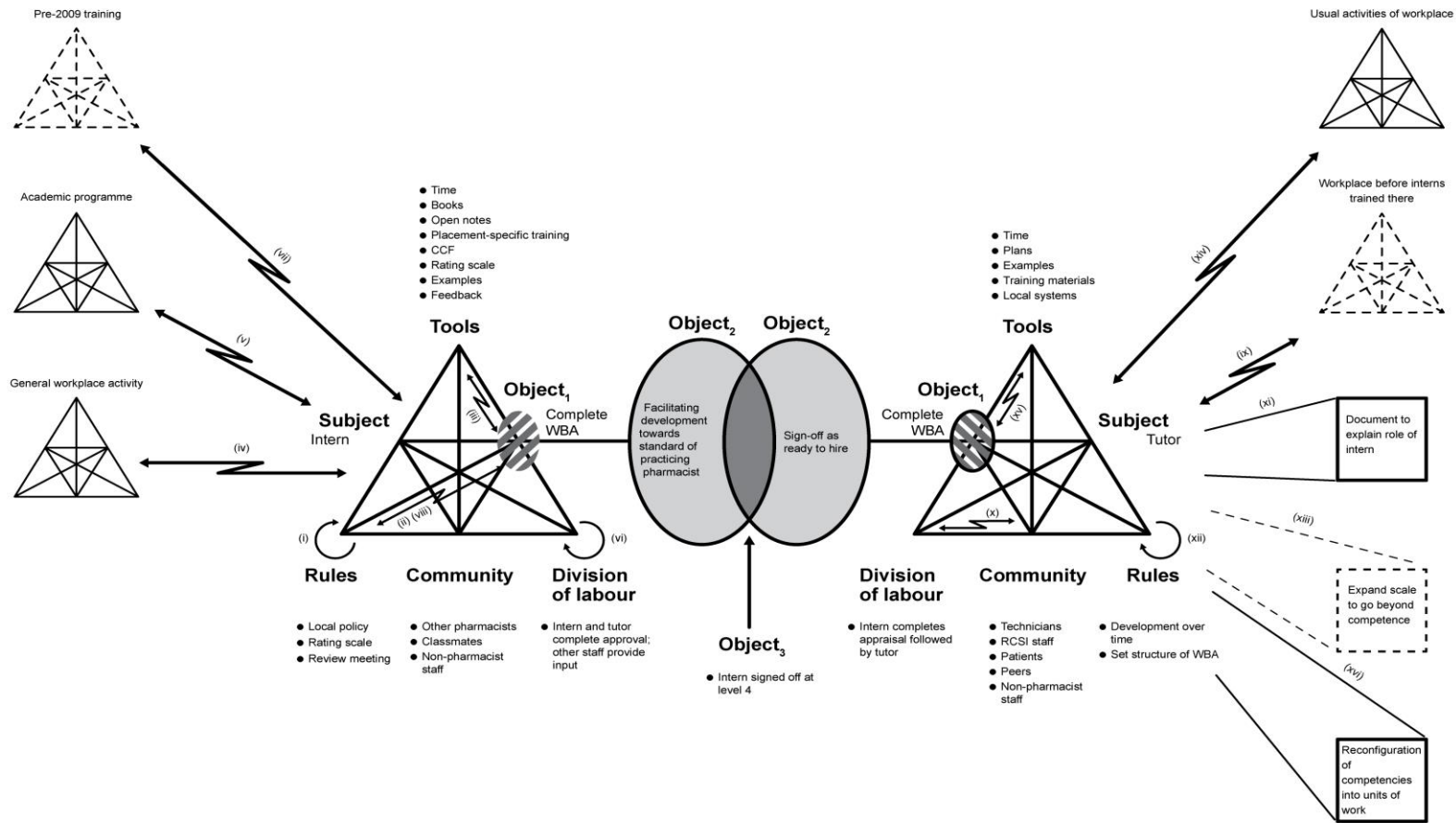


Figure 4.7. Activity System with Data from Both Focus Groups. The data from the intern and tutor focus groups are mapped to the activity system (unit of analysis).

4.5 Discussion of Key Findings

In Chapter 2, it was identified that in order to comprehensively research the potential of the Visualisation Tool to impact practice, it was necessary to first establish current practice and identify how existing technology was used. The literature review also identified that while there were many papers discussing potential strengths and challenges of WBA, empirical studies of WBA practice were rare, but that there were recent calls for WBA researchers to address this. This led to the identification of the first objective for the study, addressed in this chapter; *to explore current practices, strengths, and challenges in WBA in the NPIP, including the role of technology*. The findings are discussed below in three sections relating to current practice, strengths and challenges, and the role of technology.

4.5.1 Current WBA Practice

Current practice was explored using document analysis and focus groups. The document analysis findings related to how WBA *should* be conducted. They indicated that WBA was a complex practice that forms part of statutory requirements for pharmacy students. It has multiple interrelated elements, and that interns and tutors were required to consult several resources in order to identify all the elements and learn the WBA. No single source provided all the relevant details. This has implications for improving intern orientation and faculty development. This was developed further using focus group data to consider how this related to what *actually* happened in practice. When comparing Fig. 4.2 and Fig. 4.7 it is evident that there are many discrepancies between the components identified using the two methods. This may indicate that the training materials do not fully reflect the complexity of practice, or that interns and tutors had forgotten to mention certain components during their focus groups, or that there is some form of ‘hidden curriculum’ that had previously

gone unnoticed. It is most likely that it is a combination of all three factors in this case, but the benefits of using multiple methods is evident. The models indicate the complexity of practice in real life settings, and the challenges faced by interns and tutors to first learn about, and secondly complete the WBA as intended. Using the activity theory principle of contradictions provided clarity on the how tensions manifesting in the workplace related to various elements of the activity system. Interns and tutors reported encountering several problems relating to the rating scale, the number of competencies, competing demands for time in and outside the workplace, the influence of historical practice, and the roles of other staff. It also became evident that rather than simply struggling to try to do what they *should* be doing, many local innovations were described which had been developed with the aim of overcoming these tensions, e.g. reconfiguring the CCF, and preparing information sheets for other staff. Therefore, a key finding of this chapter is that in the NPIP practice, WBA is more complex than it is represented in the NPIP training materials, interns and tutors experience challenges in completing WBA in practice, and that local innovations have been introduced in specific cases to try to improve the experiences of interns and tutors. It is likely that this is the case for WBA more generally, and empirical studies in other contexts would be helpful for comparison.

4.5.2 Strengths and Challenges of NPIP WBA Practice

In Chapter 2 (Section 2.7.2) the relationship between the NPIP WBA (as understood then) and the strengths and limitations described in the WBA literature were explored. This was examined in terms of the competency framework, rating scale, the one-to-one relationship between the interns and tutors, intern self-assessment, tutor assessment, meetings to discuss assessment, and role of Compass technology. I reconsider each one below in light of the findings from the document analysis and

focus groups in this chapter. The role of technology is considered separately in Section 4.5.3 below.

In Chapter 2, before completing this empirical work, it was not possible to identify if the CCF represented a strength due to its national focus (Holmboe et al., 2010), or if this made it too general to reflect the usual activities of the workplace (Lurie et al., 2011, p. 49). The focus group findings identified that in practice, the CCF was reported to have both strengths and some limitations rather than being either ‘good’ or ‘bad’. Many participants indicated that the CCF provided a structure that was helpful in informing them what they needed to achieve. This reflects findings from a recent interview-based study by Storrar, Hope, and Cameron (2018) which found that trainees appreciated clear guidance on what constitutes competence and therefore what they needed to achieve to progress. In other studies, trainees have reported understanding frameworks to be challenging due to terminology (Lomis et al., 2017), but the participants in the focus groups did not report this as a challenge. The tutors agreed that the CCF structure helped them approach the WBA in a more balanced manner, and highlight positive aspects of the intern’s behaviour, rather than only “looking for alarm bells for things that are going wrong”. Some participants, particularly in non-clinical placements, found some elements of the CCF not relevant to their context. Affected interns found this disheartening (e.g. “I found it very difficult to do because there was huge chunks that are not applicable, so you’re there scrolling down going, can’t do that, can’t do that’, and that’s a little bit disheartening as well, you looking at a whole big list of things going, I have no idea what any of this is about”). Some tutors sought to overcome this tension by developing local solutions (e.g. “Well to be honest, out of the 144 (sic) I think there’s just so many. We did an exercise about two years ago here we got all the tutors together and we just had a

spreadsheet of all the core competencies and we matched the behaviours described in the core competencies to what the actual day job of the intern was within our section”) (labelled xvi, Fig. 4.7). Adapting national frameworks to local teaching contexts is known to be challenging (Delany et al., 2016), and this description of the tutor’s efforts to overcome this represents an example of expansive learning (labelled xiv, Fig. 4.7). Interestingly, the tutor’s approach described appears to have similarities to the EPA-based approaches now commonly employed to overcome the limitations of checklist-based WBA. With EPAs, competencies (which are considered to represent personal qualities) are reformulated into units of work that can be observed as part of standard workplace activities (Caverzagie et al., 2015; ten Cate & Scheele, 2007).

The next consideration is the rating scale, which was identified as both a tool for achieving the object and a rule that mediates how those involved work together. The interns generally reported finding the scale helpful as a tool for tracking progress over time. There were some indications that it was challenging to use (e.g. “So there is a lot to think about at once...”) but in general the interns did not report many issues with using the scale. Interns indicated that they felt that seeking to achieve a Level 4 rating as competent did not facilitate development in areas beyond minimal competence (e.g. “It’s just kind of like, this person is going to give me a fours anyway...so...it’s kind of like maybe there are other things I could have improved on...but you don’t know.”). This represented a secondary contradiction between the assessment as being a requirement but also playing an important role in development (labelled ii, Fig. 4.7), and reflects concerns in the literature over WBA and reductionism. The tutors similarly expressed concern that the rating scale as a rule did not facilitate recognition of excellence, as the requirement was for sign-off at level 4 or competent, (for example one tutor explained, “...170 people shouldn’t all have the exact same score in

the CCF, it just doesn't make sense. They agreed that having a scale that could reflect natural variance in ability beyond the level of competent would be useful in more accurately assessing their intern's progress, providing balanced feedback, and encouraging excellence rather than minimum competence (labelled xiii, Fig. 4.8). They appeared to feel that the WBA was simultaneously 'tick-box' and useful, which reflects previous findings from a survey-based study of academics (Dobbins, Brooks, Scott, Rawlinson, & Norman, 2016). All interns and tutors referred to competence in numerical form (e.g. (tutor) "you have to give between a one and a four") which they appeared to interpret similarly (e.g. an intern summarised "it's like four for excellent, and one for oh my God I'm useless"). This indicated some limitations in the use of the CoDEG scale. Rather than referring to some kind of criterion that could meaningfully guide development (e.g. I needed help to demonstrate X) which is the preferred approach in WBA, they used language more traditionally associated with norm-based assessment (Pereira et al., 2018). Construct-aligned scales e.g. the *Zwisch* (George et al., 2014) and other scales (Crossley et al., 2011) may improve this process (Rekman, Gofton, Dudek, Gofton, & Hamstra, 2016). However, the rich descriptions provided by the interns and tutors indicated that while the assessment may ultimately be represented as a number from the rating scale, each rating is based on considerable thought. Capturing this in narrative form using a mixed-methods approach may help improve assessment and feedback (Hoang & Lau, 2018).

The NPIP WBA requires a one-to-one intern to tutor relationship where they work together a minimum of three days per week and the tutor is responsible for the intern's final rating at Level 4. The WBA literature suggests that this approach is not ideal, and that multiple assessors should be used in determining the competence of a trainee to overcome assessor shortcomings (Lockyer, Carraccio, et al., 2017, p. 611). On the

other hand, having too many assessors and rotations can impact on the trainees' ability to build relationships (Storrar et al., 2018) and may compromise patient safety (Englander & Carraccio, 2018). The document analysis indicated that the intern and tutor work alongside each other (community) and that they complete the assessments as per the requirements (division of labour). However, the focus groups indicated that while this is true, interns and tutors felt there were many others involved in the WBA, whether their roles were formally recognised or not. This appeared to vary between placements according to the interns (e.g. an intern who had undertaken placements in different environments commented "...so it depended on each person's individual setting, how many people fed into your own assessment of yourself and your tutor's assessment of you"). While beneficial for assessment, this one-to-one relationship resulted in contradictions arising from the perceived requirement to keep the tutor happy; with interns agreeing that their behaviour was therefore influenced when their tutor was present (e.g. "I ended up having to go with my tutor just for the repercussions of it"). Tutors described how they included opinions of others in their assessment of intern's progress, including views of technicians, patients, and other team members, although this did not reflect normative practice according to the document analysis findings. As the tutor still made the final decision based on this information, there was no contradiction evident, but it was interesting to note that it was happening as part of practice to overcome perceived limitations of the existing system. Multisource feedback is an established approach in WBA, and it appeared that some tutors were intuitively identifying the recognised benefits of multiple assessors (Lockyer, 2013). The fact that the relationship between the intern and tutor was one-to-one, led to the manifestation of other contradictions, where other staff did not understand the role of the intern and appeared to be unclear about the role of the intern

(labelled ix, Fig. 4.7) or frustrated at the perceived superior learning opportunities afforded to them (labelled x, Fig. 4.7). The clarification of trainees' roles is an important part of identity formation during workplace-based learning (Jarvis-Selinger et al., 2012), and clarification was considered key to tutors who suggested developing methods to clarify with other staff (e.g. information sheets) which represented a form of expansive learning to overcome the identified problem.

The core of the WBA consists of intern self-assessment, tutor assessment, and subsequent meeting to discuss the ratings and feedback. Most of the interns reported finding this process useful for their development, and received feedback and encouragement (e.g. "I would say it was constructive and I knew what to do and what I had to improve, and even things I would have, again, marked myself lower and she would have said 'Why are you putting yourself that?' So I think from that point of view they were constructive."). Others suggested that it became a tick-box exercise (e.g. "Are they good enough? Are they okay? Yes, no?"). This represents a primary contradiction within the rule (labelled i, Fig. 4.7). In terms of self-assessment, the interns relied on using the CCF to stimulate thinking around examples of practice or estimation of confidence. Repeated reference to 'confidence' rather than competence appeared to suggest limitations in some interns' self-assessment approach. Students' self-assessments have been shown to vary from assessors' assessments, with interpretation of the framework and scale considered areas where variability arise (Tallentire, Smith, Wylde, & Cameron, 2011). The activity system as informed by the document analysis and focus group data highlights the training tutors receive as being an important tool, but findings indicate that the training may oversimplify the complexity of WBA to a degree. This aligns well with the literature on WBA which states that faculty development is an important aspect of WBA (Holmboe et al., 2011;

Lockyer, Carraccio, et al., 2017, p. 612). Rather than mentioning being trained on rating scales, tutors reported applying skills learned in training during WBA (“especially if you are giving negative feedback...and how to give it in the best way”). One of the main problems manifesting with the WBA was having sufficient time to complete the appraisals, particularly for the first one, which took the longest. Interns and tutors both described conflicts between WBA and the role of the intern and tutor as delivering professional services and completing academic programmes in parallel. As the WBA was not completed using assessment tools designed for real-time observations (e.g. mini-CEX), it required a separate meeting, which was a challenge for some leading to a quaternary contradiction between the WBA and the general activities of the workplace (labelled xiv, Fig. 4.7). This was described by many participants in both groups (e.g. one tutor stated, “You have ideas and plans and set time aside then you get an urgent query from ICU. The time management aspect of it is very difficult.”). The balance between the role of trainees as learners and assessors as service providers is an established challenge for WBA (Nousiainen et al., 2017, p. 596). The WBA is completed as two formative assessments, and one summative, and while there are no target scores for the first two assessments, tutors indicated that they expected to see development over time, and some looked for certain general indicators. One tutor stated that they expected to see development across the three WBAs as follows, “I always...[expect that my] intern in community [pharmacy] [progresses from] an excellent OTC assistant, [to] an excellent technician and [is finally] an excellent pharmacist”. A developmental trajectory is formally required in many medical CBME programmes, where the trainees should develop in accordance with particular ‘milestones’ (Lowry, Vansaghi, Rigler, & Stites, 2013), but this is not required in the NPIP WBA. They did not specifically discuss individual scores when

describing learning, but instead focused on more holistic decisions. This aligns with the findings of Regehr et al. (2012) who studied faculty decision-making and demonstrated that faculty can make consistent decisions without relying on deconstructed competencies, although this does not reflect the aims of faculty development provided to try to achieve ‘reliable’ ratings (Pelgrim et al., 2011). Feedback is considered an important aspect of WBA and contributes to trainee acceptance of WBA (Ross et al., 2012). Interns considered feedback an important tool for learning, although not all interns reported receiving it, and such variability has been reported in other WBA studies (Holmboe, 2004, 2015). One intern suggested that having textboxes after each behaviour to facilitate gathering of information could be useful where tutors were not making the time to provide feedback as “at least that would prove maybe that they’re doing something”. As well as introducing a level of proof of engagement, this would also facilitate recording of more narrative comments, which is useful for gathering holistic information for decision-making (Ginsburg et al., 2011). It could also add credibility to the feedback and address emotional obstacles if given in the context of a conversation (Tekian et al., 2017) . Feedback is a vital component of WBA, and it was concerning that this important element of WBA was not being provided to interns in some cases, although this variability has commonly been experienced elsewhere (Holmboe, 2004, 2015).

4.5.3 Role of Technology in WBA Practice

The objective addressed in this chapter also relates to technology, as this is relevant to the overall research aim. It is important to note that findings from the document analysis or focus groups with interns and tutors did not imply that the role of technology should be isolated for particular consideration. Instead, Compass was discussed as one of the many tools that is used by interns and tutors as part of WBA. It

was identified that Compass was used for three particular steps of the WBA process first to enter ratings individually, second to review data prior to the review meeting, and thirdly in the review meeting.

Use of Compass *should* have made assessment more efficient and reduce reliance on paper forms (Nousiainen et al., 2017, p. 596). However, it was reported to cause several problems due to design issues or VLE security issues (e.g. “[it] would lock out”). Participants described low-tech ways of avoiding these problems (potential expansive learning) such as using a paper-based approach before entering their own scores using a computer. For example, one intern reported, “I found when I went to the computer and you clicked the question mark [to show the full behavioural description], sometimes the information just disappeared too quickly by the time you finished reading it. So that’s why I printed it out.” with others agreeing. One tutor suggested that the Compass was so difficult to use that it had the potential to impact on engagement with the WBA stating “[Compass is] cumbersome, just the drop-down menus, having to focus on all, took a lot of time. It’s very hard, like I’m sure if you did an analysis across all interns their scores in MP6 [the final domain], by the time they get there, they [interns] just give up”. While this blame is attributed to Compass, it is clear that the length of the descriptors and the lengthy process is primarily determined by the requirement to use the CCF rather than Compass. This indicated how considering the activity system components in isolation might inadvertently overlook the role of the relationship between tools. Findings from this chapter suggest that Compass is seen as one of a large number of tools used as part of WBA, and although it caused periodic technical issues, it was largely unremarkable in the overall WBA practice, and appeared to be associated with a primarily administrative role.

4.6 Chapter Summary

The objective of this chapter was to comprehensively study existing practice empirically to address a key gap in the literature identified in Chapter 2 highlighted by many authors and to use the findings to provide the context for studying the introduction of the Visualisation Tool. There are three key findings. Firstly, WBA practice is much more complex than presented in NPIP training materials or in the WBA literature. It is comprised of multiple interrelated components, many of which appear in conflict leading to challenges in completing WBA as it should be done. Interns and tutors reported implementing local solutions to overcome these challenges in their particular contexts, leading to local variation in approaches to WBA, which has been heretofore not explored in the literature. Assuming that WBA leads to ‘standardisation’ of assessment is therefore possibly erroneous. It was also possible to explore the strengths and weaknesses of the NPIP WBA in terms of the contested literature on the subject through empirical study rather than relying on the predominant opinion and perspective publications. The findings from this chapter suggest that rather than WBA being ‘good’ (Holmboe, 2018) or ‘bad’ (Krupat, 2018) as the polarised literature on the topic seems to suggest, in practice it has both strengths and challenges, which appear to be somewhat dependent on the approach to WBA and the context. The role of Compass and technology is a key consideration for this research. Findings indicated that Compass as a tool used in WBA, was associated with some challenges including technical issues, design issues, and usability. Recognising that it was not considered by participants to be of particular note was important context for the following chapter, which aims to look more closely at Compass and the introduction of the Visualisation Tool in more detail.

Chapter 5: User Testing and Practice Observations

Lastly nothing can have value, without being an object of utility. If the thing is useless, so is the labour contained in it; the labour does not count as labour, and therefore creates no value.

–Marx (1867)

5.1 Introduction

The purpose of this chapter is to explore the role of technology in more detail. In Chapter 4, Compass was identified as one of several tools used by interns and tutors in their WBA assessment practice, and while it caused some technical problems, it was generally considered unremarkable. This chapter aims to ‘zoom in’ to focus more closely on the role of Compass as a mediating tool, and to identify the impact of the introduction of the new Visualisation Tool. This chapter relates to the second objective of this thesis; *to explore how interns and tutors use compass technology with(out) the Visualisation Tool during WBA*. I start by providing a brief overview of the role of technology in WBA. I then focus on the use of Compass with and without and the Visualisation Tool during WBA in the context of how they reported using Compass in Chapter 4.

5.2 Background

The potential importance of technology in CBME/WBA is highlighted by Nousiainen et al. (2017, p. 596) in their recent overview of issues in CBME implementation in practice. The authors suggest that technology is an important factor in CBME implementation and of particular relevance to WBA. In this publication, technology is framed as a primarily administrative concern. Upon closer inspection, their discussion of technology and CBME draws primarily on two highly cited but largely narrative (and somewhat dated) commentaries. These commentaries by Ward, Gordon, Field,

and Lehmann (2001) and Ruiz, Mintzer, and Leipzig (2006) concern technology in medical education that are not specific to WBA or CBME. This kind of general reference to the administrative role of technology is evident in several other WBA-related publications (Peters, Holzhausen, Boscardin, ten Cate, & Chen, 2017, p. 806; ten Cate et al., 2015a, p. 998; van der Vleuten & Verhoeven, 2013). It somewhat reflects the findings from Chapter 4, that suggest that is how technology is seen in practice.

A small number of studies focus more specifically on the role of technology in WBA. A study by van Der Schaaf et al. (2017) provides a detailed overview of the development of an electronic portfolio with learning analytics for multiple professions, and a corresponding evaluation. It is of particular relevance for this thesis as it features a visualisation element where progress over time is recorded. The authors report that the participants favoured the visual presentation of their survey-based evaluation data, however the response rate was low, and the results presented are from a preliminary design stage (van Der Schaaf et al., 2017). Other studies are less detailed, for example, Ferenchick and Solomon (2013) evaluate the use of a new software in their research, concluding that ‘although not an objective of this study, we believe such technology holds great promise for use in authentic clinical settings for measuring student achievement related to educational milestones’. It is therefore clear that there is a need for research that specifically considers the role of technology in WBA in a purposeful and comprehensive manner.

As shown in Chapter 2 (Table 2.4), there are also a small number of empirical studies relating to radar-graph based tools in WBA. This small group of heterogeneous empirical studies, primarily describe the development of radar graph based

visualisation applications to address perceived challenges in interpreting data derived from checklists (Harrington et al., 2015) and help avoid the deconstruction of competencies into individual behaviours (Keister et al., 2012). These studies consider the role of radar graphs primarily from the perspective of development and user acceptability (Bevitt et al., 2016; Lee & Mak, 2010), but do not consider how they are used in practice or how they related to existing method to manage WBA data or practices. Therefore, achieving the objective of this chapter will both contribute towards achieving the overall aim of this thesis, and also study radar graphs and WBA in a novel manner. The rest of this chapter describes how this was achieved.

5.3 The Role of Compass in WBA

In Chapter 4, WBA was identified to be a complex practice with several interrelated and sometimes conflicting components. Several mediating tools were identified in both the document analysis and focus groups; one of which was Compass. As described in Section 2.4, Compass was originally developed as a system to the facilitate input, collation, and display of WBA ratings by interns and tutors. When describing its use in practice, interns and tutors described using the system in three ways. Firstly to input their ratings and secondly to access the collated ratings before the review meeting to compare their scores and prepare notes. Finally, Compass was used during the review meeting to facilitate discussion about the intern's progress towards Level 4 ratings. This is summarised in Fig. 5.1 below.

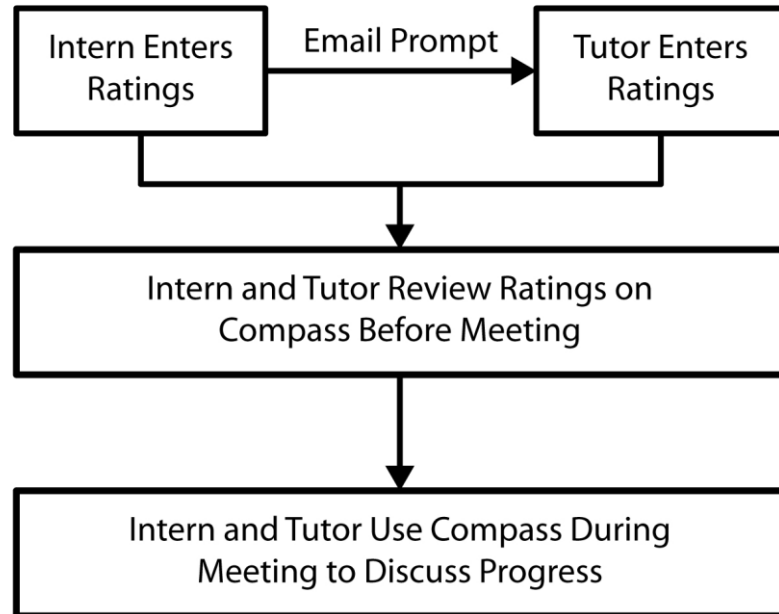


Figure 5.1 How Compass Was Used in Practice for WBA.

The Visualisation Tool was designed to translate the checklist-derived numerical rating data into a graphic form to help interns and tutors better understand their assessments. This also contributed towards more meaningful discussions about the intern’s performance and development, similar to the aims of others who had undertaken similar development work (Harrington et al., 2015; Lee & Mak, 2010). Therefore this chapter focuses on the use of Compass and the Visualisation Tool during the second and third steps of use identified in Chapter 4 (shown in Fig. 5.1), namely the individual tutor and intern review of collated ratings, and during the review meeting. Each is considered in turn below. Firstly, how interns and tutors used Compass with and without the Visualisation Tool to review the ratings and prepare for the review meeting is explored. Secondly, how interns and tutors used Compass with and without the Visualisation Tool during their review meetings is explored.

5.4 Activity Theory, ZPD, and the Double-Stimulation Method

In their recent review, Clemmensen et al. (2016) provide a comprehensive analysis of the use of activity theory in the study of 109 studies relating to HCI, demonstrating its widespread use and value as a theoretical framework in HCI research. In this study specific activity theory concepts are used in combination, and the rationale is outlined below.

5.4.1 Zone of Proximal Development

In order to operationalise activity theory in this part of the research, the concept of ZPD was used to frame the study of the use of Compass and the Visualisation Tool in the review of ratings prior to and during the review meetings. The ZPD is a Vygotskian theory that has traditionally been associated with children's learning considered to be the conceptual space or zone between what a child is capable of doing on their own, and what he or she can do with help from an adult, or a more capable peer (Engeström, 2014, p. 139). It has also been applied to the study of technology, most often conceptualised using Engeström's (2001) definition of expansive learning as a 'collective journey through the *zone of proximal development* of the activity system'. This kind of transformation involves the creation of new knowledge and new practices for an emerging technology, and may be triggered by the introduction of new technology (Daniels 2008, p.127). Therefore in this chapter, a double-stimulation experimental design to establish the ZPD of the tool, i.e., what participants could do with the help of the Visualisation Tool compared to what they could do using Compass.

5.4.2 Double-Stimulation Experiment

In order to identify the ZPD of Compass and the Visualisation Tool it was necessary to select an appropriate method to do so. Vygotsky's concept of double stimulation provides the conceptual basis for the selection of data collection and analytical approaches used. Double stimulation experiments involve putting the participant in a structured situation with a problem, and providing a new approach (in this case the new Visualisation Tool) to solve the problem (Van der Veer & Valsiner, 1991, p. 167). Double stimulation can be used as a *principle* to refer to everyday practices used by people to undertake difficult action (e.g. a knot in a handkerchief to aid remembering), or as a *method* to trace the structure of higher mental processes (Hopwood & Gottschalk, 2017), or as the basis for *formative interventions* (e.g. the change laboratory methodology) (Daniels, 2008, p. 133). In this chapter, double-stimulation is used as an experimental method to understand more about the role of the Visualisation Tool in competence assessment practice in the two steps outlined above.

5.4.2.1 Use of Compass and the Visualisation Tool to Review Ratings

As shown in Fig. 5.1, interns and tutors first used Compass to record ratings individually, and these ratings are collated and displayed side-by-side. Interns and tutors next individually reviewed the collated ratings prior to discussing them in a scheduled review meeting; this independent review of the ratings is therefore an important step of the WBA to study. In order to do this, it was necessary to design a double-stimulation experiment that reflected how Compass was used in practice, and how the Visualisation Tool differed.

An activity theory-based double-stimulation method described by Vrazalic (2003a) was used as the basis for designing this experiment. Her approach was designed to

focus the study of technology on how well it supported users to do what they wanted to do, rather than on whether the technology worked from a technical perspective (Vrazalic, 2003b). Using this approach required the development of realistic ‘activity scenarios’, to ensure the simulated scenario would plausibly represent ‘real-world’ use. Vrazalic (2003b) recommends that scenario development be based on qualitative data gathered from participants. It was therefore possible to use the qualitative data gathered during the focus groups to inform the design of the scenarios.

Focus group discussion findings had identified that the most common scenario when reviewing the collated data was that the intern and tutor had awarded the same rating, indicating that they agreed about the intern’s competence. Less frequently, there was evidence of disagreement, where the intern awarded a higher score than the tutor or vice versa. Finally, the discussions had revealed that ratings from the first WBA tended to be relatively low, with few ratings of three or four. These findings were used to generate realistic activity scenarios used for this double-stimulation experiment. As this part of the study (described in detail in Section 5.5.2) required participants to review data using Compass, then the Visualisation Tool, two sets of data designed to realistically represent a standard first WBA were prepared. Examples of simulated ratings from Domain 1, Competencies 1.1 and 1.2 are provided in Table 5.1 below for illustrative purposes. In the following sections, the participant recruitment and double-stimulation research procedures relating to the study of how the interns and tutors used Compass and the Visualisation Tool to compare ratings independently before the review meeting are described in detail.

Table 5.1 Examples of Simulated Ratings: Domain 1, Competency 1.1

Competency/ Behaviour	Code	Description	Intern Rating	Tutor Rating
Competency:	1.1	Practises ‘patient-centred’ care		
Behaviours:	1.1.1	Demonstrates a ‘patient-centred’ approach to practice	2	2
	1.1.2	Ensures patient safety and quality are at the centre of the pharmacy practice	2	2
	1.1.3	Educates and empowers the patient to manage their own health and medicines	3	3
	1.1.4	Acts as a patient advocate to ensure that patient care is not jeopardised	3	2
	1.1.5	Monitors the medicines and other healthcare needs of the patient on a regular basis and makes recommendations for improvement to the patient and other healthcare professionals as appropriate	2	1
	1.1.6	Understands patients’ rights to receive safe and high quality healthcare including pharmacy care and ensures that patient care delivered reflects evidence-based practice	3	1

5.5 Using Compass to Review Ratings before Review Meeting

5.5.1 Participants and Procedures

5.5.1.1 *Participants*

Participants were considered eligible to participate if they met the same criteria as for the focus groups described in Section 4.4.2.1. The initial aim was to recruit five interns and five tutors for this part of the study, and to recruit more should this be necessary after a preliminary review of the data collected. After preliminary data review, it was not considered necessary to recruit beyond the original aim. As the user testing part of the research required the setup of recording equipment for participants, participants needed to be willing and able to come to the School of Pharmacy to participate.

5.5.1.2 *Ethical Considerations*

As the research involved the recording of participants, ethical approval was sought from Lancaster University. Participants were invited to take part via an email with a participant information sheet attached (Appendix 2). They were asked to respond if

they were interested in taking part in the study, and completed a consent form before participation.

5.5.1.3 *Physical Environment*

The environment for the user testing was a meeting room in the School of Pharmacy. This room had a desktop computer with screen-recording technology (Adobe Captivate® and Camtasia®), space for the other recording equipment, and was in a quiet part of the building so likelihood for disruption was minimal. The room had enough space for the participants to sit at the computer with me present sitting at a table where I could hear and see them but not distract them with my presence. The layout is shown in Fig. 5.2 below.



Figure 5.2. Room Layout for User Testing. Participants sat on the chair facing the computer, the researcher sat at the table behind them to make notes as they completed the tasks. Kindly posed by colleagues.

5.5.2 Research Procedures

Upon arrival, the same protocol was followed for all participants. Firstly, they were greeted, and made comfortable and refreshments were offered. Next, the participants were talked through the participant information leaflet and invited to ask questions. The consent form was then signed by participants. I explained how the recording would take place, indicating clearly what would/would not be recorded. Participants were then seated at the computer and asked if they had any final questions or requirements before they started the tasks.

5.5.2.1 *Tasks*

As described above, the tasks for completion by the participants were designed based on realistic 'activity scenarios' and formed the basis of the double-stimulation experiment. Each participant was asked to complete the same tasks. The first required them to assume the role of the intern or tutor (as per their own role) and review the ratings visible on Compass as if their own and they were preparing for the review meeting. Participants completed this task using a think aloud protocol (see section 5.5.2.3 below). Participants were allocated 15-20 minutes to complete as much of the review as they could within that time using their usual pace to ensure sufficient data was gathered, but to avoid participant fatigue. Then they were shown how to use the Visualisation Tool (approximately 5 minutes). For the second task, they were asked to review a second set of ratings using the Visualisation Tool, again using a think-aloud protocol, again allocated 15-20 minutes. Finally, they were asked a series of questions about their experiences which took approximately 10-15 minutes.

5.5.2.2 *Data Collection 1: Think Aloud Protocol*

In order to gain insight into both how well Compass and the Visualisation Tool worked as tools as part of the WBA, and to establish how users made meaning from the information available, a think aloud protocol was used. The think aloud method involves asking participants to think aloud while completing a task and analysing the resulting protocols, and is considered not to affect their thought processes (Ericsson & Simon, 1998). When used with sociocultural theory, it is important that the activity which the participants are completing needs to be situated in the wider context and history of the activity (Smagorinsky, 1998). In this research, this was achieved by basing the tasks on the realistic activity scenarios as previously described and recruiting participants who had experience in the process.

5.5.2.3 *Data Collection 2: Screen Capture*

In order to capture what participants were looking at when verbalising their thoughts, the screen was recorded as the participants completed their tasks while thinking aloud. Initially two methods were used. A video camera, focussed on the computer screen, that could also capture any gestures made by the participant towards the screen as they completed the tasks was used for the first two participants (shown in Fig. 5.2). This would capture the participants' screen, speaking, and gestures. Screen capturing software (Adobe Captivate®) was also used to ensure that the screen could be clearly visible for analysis and also recorded audio (Fig. 5.3). I used both approaches for the first two participants. While this seemed initially appropriate, as I completed initial review of the data, I noted that the participants did not make any noticeable gestures when completing the tasks and that it would not form part of the analysis. Therefore, the screen capture tool only was used for the remaining participants to avoid unnecessary gathering of video footage of participants (Fig. 5.4).

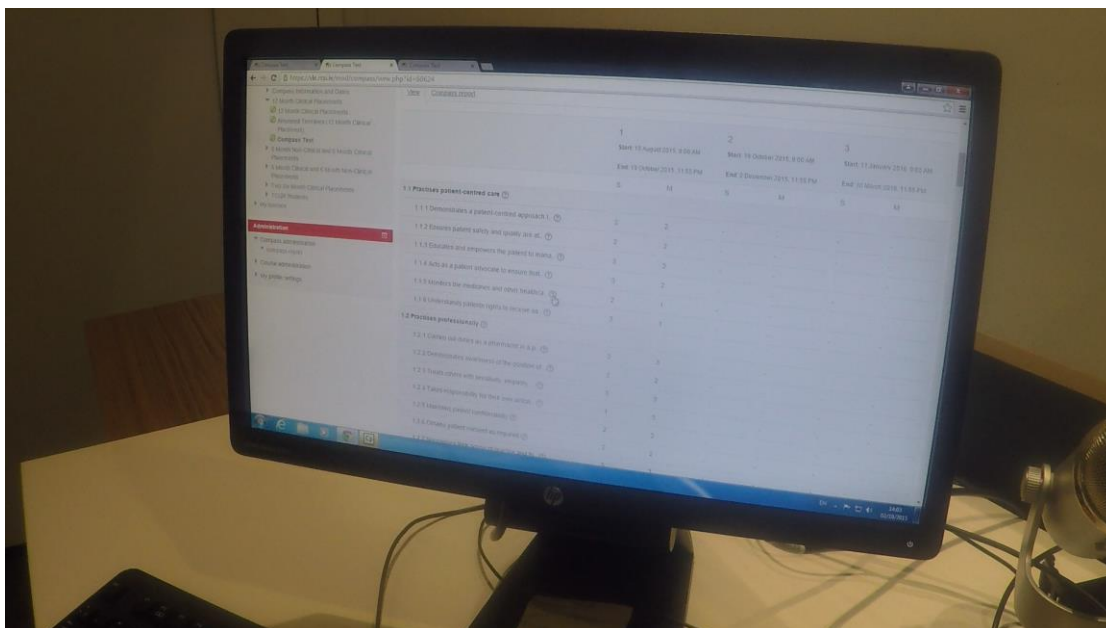


Figure 5.3. Data collection using video camera. Using this angle, it was possible to capture the computer screen, as well as any gestures made by the participants towards the screen.

- My home
- Site pages
- My profile
- Current course
 - Compass 2015-2016
 - Participants
 - Badges
 - General
 - Compass Information and Dates
 - 12 Month Clinical Placements
 - 12 Month Clinical Placements
 - Amended Timelines (12 Month Clinical Placement)
 - Compass Test
 - 6 Month Non-Clinical and 6 Month Clinical Placements
 - 6 Month Clinical and 6 Month Non-Clinical Placements
 - Two 6 Month Clinical Placements
 - TCQR Students
- My courses
 - administration
 - Compass administration
 - Edit settings
 - Locally assigned roles
 - Permissions
 - Check permissions
 - Filters

1	Rarely	Very rarely meets the standard expected. No logical thought process appears to apply	0-20%
2	Sometimes	Much more haphazard than "mostly"	21-50%
3	Mostly	Implies standard practice with occasional lapses	51-84%
4	Consistently	Demonstrates the expected standard practice with very rare lapses	85-100%

[All Students](#) | [Manages Competencies](#) | [Manage Scales](#) | [Manage Phases](#) | [Compass reports](#)

[Show list of users](#)

interntest1 interntest1

	1	2	3
	Start: 19 August 2015, 9:00 AM	Start: 19 October 2015, 9:00 AM	Start: 11 January 2016, 9:00 AM
	End: 19 October 2015, 11:55 PM	End: 2 December 2015, 11:55 PM	End: 30 March 2016, 11:55 PM
	S	M	S
1.1 Practises patient-centred care			
1.1.1 Demonstrates a patient-centred approach t.	2	2	-
1.1.2 Ensures patient safety and quality are at.	2	2	-
1.1.3 Educates and empowers the patient to mana.	3	3	-
1.1.4 Acts as a patient advocate to ensure that.	2	1	-
1.1.5 Monitors the medicines and other healthca.	2	1	-

Figure 5.4. Data collection using screen capture software. Using this approach, it was possible to clearly capture the screen as the participants completed the tasks.

5.5.2.4 Data Collection 3: Interviews

Once participants had completed their tasks, they were asked a series of questions.

These questions were designed to clarify whether the participant had used Compass to

complete the tasks represented and how they had used Compass in their own WBA. They were also asked about their use of the Visualisation Tool, and how it impacted on their approach. They were invited to provide any comments or queries not yet captured.

5.5.3 Findings and Data Analysis

In total, five interns and five tutors were recruited for this part of the study. For each participant a large quantity of data was generated, that included audio and screencast data, as well as interview data. For one participant (T4) the screencast file was corrupted and it was not possible to retrieve the data, however the audio file was not damaged and the transcript was included in the analysis. Therefore, it was not considered necessary to recruit another participant. In order to manage this large amount of information, the following analytical approach for use with video data described by Heath (2010, p. 61) was used. A *preliminary review* of the data was initially completed, followed by a *substantive review* and an *analytic review*.

A preliminary review involves cataloguing the data corpus to record some basic aspects of the events that have been recorded (Heath, 2010, p. 64). This is shown in Table 5.2 below. Next, a substantive review of the data was completed which involved going through the data in a more focused manner to manually record events of interest. Finally, I completed an analytical search of the data corpus informed by the activity theory framework used in this study (section 5.3.4.1).

Table 5.2. Preliminary Review Data from User Testing.

Participant	Time on Compass	Time on Visualisation Tool	Time for Interview	Data Sources	Comments About Participants/Relevant Field Notes
I1: Intern; male	00:00:06- 00:16:37	00:20:41- 00:38:37	00:41:31- 00:45:49	Video File Screencast	Participant started by looking for differences in scores. No problem using Compass or the Visualisation Tool. Field notes: Focussed only on differences when using Compass, mentioned similarities with Visualisation Tool.
I2: Intern; female	00:00:11- 00:15:36	00:18:37- 00:22:29	00:25:27- 00:34:12	Video File Screencast	Participant initially struggled with the think aloud method but once clarified had no more problems. No problem using Compass, slight confusion initially re visualisation. Field notes: Used Compass as expected, but made some errors with interpretation of the Visualisation Tool (did not click all competencies, therefore missed several behaviours).
I3: Intern; male	00:07:23- 00:26:05	00:29:02- 00:48:15	00:49:21- 00:55:40	Screencast Audio File	Participant started at the top of the list and worked through the behaviours. No problem using Compass or the Visualisation Tool. Field notes: Had to remind participant to ‘be’ the student. When moved to Visualisation Tool looked holistically, rather than the approach taken with Compass which was fragmented.
I4: Intern; female	00:02:40- 00:20:42	00:24.:17- 33:00:06	00:33:16- 00:41:54	Screencast Video File Audio File	Participant started at the top of the list on Compass and worked systematically through the steps. Gave careful consideration to the meaning of the competencies, highlighting lack of clarity. No problem using Compass or the Visualisation Tool. Field notes: Felt instances where tutor’s marks were higher were ‘good’ and where intern’s marks higher were ‘bad’.
I5: Intern; male	00:02:05- 00:11:49	00:14:55- 00:35:40	00:36:50- 00:42:45	Screencast Audio File	Participant started by summarising various competencies on Compass, saying which ones matched/needed focus, then went through behaviours one-by-one. Field notes. Started by competency, scanning and screening looking primarily for differences thereafter. Used Visualisation Tool easily.

T1: Tutor; female	00:01:06- 00:18:49	00:22:24- 00:36:25	00:37:28- 00:45:10	Audio File Screencast	<p>Strong interference in audio recording from screencast, loud buzzing noise evident. Difficult to hear the participant in places. Audio file better, synchronised with screencast for analysis. Participant started at top and worked through systematically. Gave extensive examples.</p> <p>Field notes: Was focused on patient safety in terms of assessment. Used ‘you are a three’ etc. All competencies taken as equally important. Initially less certain about use of Visualisation Tool, but then proceeded quickly.</p>
T2: Tutor; male	00:01:15- 00:17:15	00:21:38- 00:33:20	00:33:25- 00:43:10	Audio File Screencast	<p>Strong interference in audio recording from screencast, loud buzzing noise evident. Combined with building work in the background this made it very difficult to hear the participant in places. Audio file better, synchronised with screencast for analysis. Participant started at top and worked through systematically.</p> <p>Field notes: Stated repeatedly that a two was ‘standard’ for the stage in the year, and three was ‘quite high’. Appeared to work on the basis of stage in the year rather than competence assessment.</p>
T3: Tutor; male	00:01:40- 00:14:35	00:17:34- 00:25:41	00:25:50- 00:37:47	Screencast Audio	<p>Participant wanted a sheet of paper and pen while working through though did not write anything. Struggled initially with think aloud method, tended to focus on explanation but improved.</p> <p>Field notes: Wanted access to printed materials, explained how they completed their WBA rather than using think aloud in places.</p>
T4: Tutor; female	00:00:30- 00:15:30	00:19:00- 00:27:23	00:27:34- 00:38:29	Audio Screencast (file corrupted)	<p>Screencast file corrupted when recorded. Audio file remained accessible and included in analysis. Participant worked down through the competencies using Compass and Visualisation Tool without difficulty. Related competency to time, and stage of year frequently.</p> <p>Field notes: Related scores strongly to stage in the year, and suggested that time was needed for competence development.</p>
T5: Tutor; female	00:00:04- 00:16:52	00:19:22- 00:29:56	00:30:03- 00:34:58	Audio File Screencast	<p>Participant worked down through the competencies followed think aloud protocol easily. Had no difficulty operating Compass or the Visualisation Tool.</p> <p>Field notes: Related competencies to frequency regularly, described what could be done to help intern.</p>

5.5.3.1 *Analytic Review Findings: Reviewing the Ratings Before the Meeting*

According to the approach described by Vrazalic (2003b), analysis of the data gathered from user testing should focus on identifying how participants used the technology. Therefore, in the analysis of the data corpus, the first step was to establish how each participant approached the task and how they used technology through reviewing the screencasts and interview data. Micro-level analysis, such as recording the number of clicks or time taken was not required when using this approach (Vrazalic, 2003a, p.45). However, illustrative data are provided to indicate how the analysis of screencast and interview data led to development of an indicative narrative overview of how participants used Compass and the Visualisation Tool. The activity theory principle of contradictions, actions, and operations were used to analyse disturbances or issues manifesting during the user testing. The findings and illustrative coding examples are presented in the following pages.

Compass

Use of Compass

1. Interns and tutors generally commenced their review of the data starting at the top of the list of behaviours before moving sequentially down the list, following the structure presented on Compass. Some checked the rating scale, most did not.

Illustrative Coding

T1: Screencast and Think Aloud

Time 00:01:06-00:02:28

Compass display

Competency ID	Description	Rating
1.1.1	Demonstrates a patient-centred approach to practice	2
1.1.2	Ensures patient safety and quality are at the centre of practice	2
1.1.3	Educates and empowers the patient to manage their health	2
1.1.4	Acts as a patient advocate to ensure that patient safety and quality are at the centre of practice	2
1.1.5	Monitors the medicines and other healthca...	2
1.1.6	Understands patients rights to receive sa...	3

Speech

So demonstrates a patient-centred approach to practice, a two, and a two.

Interaction with Compass

Scrolled down to the first behaviour on list and clicked to expand description. Read behaviour aloud.

Description

Participant commenced the review starting at the first behaviour and working down through them one by one.

Max	Rating	Definition	Percentag
0/0	0/0	Not applicable if the training establishment	0%
1	Never	Very rarely meets the standard expected. No logical thought process appears to apply	0.0%
2	Sometimes	Sometimes meets highlighted term "mostly"	25.0%
3	Mostly	Implies standard practice with occasional lapses	50.0%
4	Consistently	Demonstrates the expected standard practice with very rare lapses	75.0%

So much more haphazardly than mostly. So that's a two, need to be more patient-focused with care, want to be consistent by the end of the year with the patient at the centre of everything you do.

Scrolled up to check the rating scale to interpret the data.

Participant scrolled up to review the rating scale before commenting on the scores.

Competency ID	Description	Rating
1.1.2	Ensures patient safety and quality are at the centre of the pharmacy practice	2
1.1.3	Educates and empowers the patient to manage their health	2
1.1.4	Acts as a patient advocate to ensure that patient safety and quality are at the centre of practice	2
1.1.5	Monitors the medicines and other healthca...	2
1.1.6	Understands patients rights to receive sa...	3

The next one is ensures patient safety and quality are at the centre of practice. So two for both of those. So again that means mostly haphazard. You know are they the right tablets, need to check those things, for safety.

Scrolled down to next behaviour on list and clicked to expand description before reading it.

Participant scrolled down to the next competency in the list and reviewed the scores.

2. For each individual behaviour, they clicked on the question mark beside the behaviour on Compass to expand it, read it aloud, read the ratings as numbers and then expressed some opinion/ rationale about the rating made. In some cases (mostly by tutors), examples were provided to support the decision made.

T5: Screencast and Think Aloud

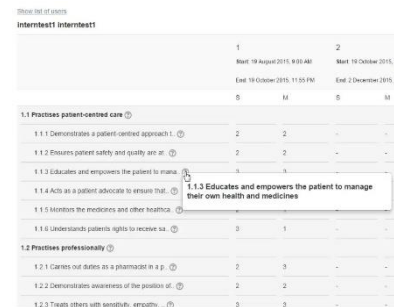
Time 00:00:49-00:02:07

Compass display

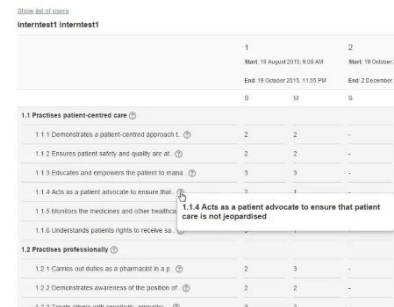
Speech

Interaction with Compass

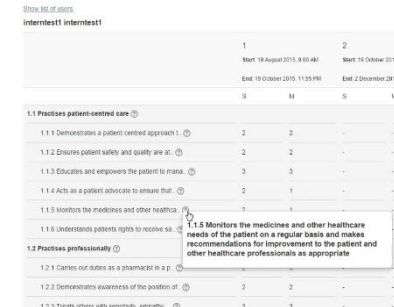
Description



Educates and empowers the patient to manage their own health and medicines. So she is quite good at counselling the patient, making sure the patient understands. She realises she is not doing it at all stages, so she just needs to work on that, make sure she's got her knowledge and counselling skills up to date so she can do that at all stages.



Acts as a patient advocate to ensure that patient care is not jeopardised. So, she's not looking at patient safety. She's not doing it all the time. She obviously thinks she's doing it more than I would see her doing it. She would need to – I think I'd need to just explain to her why she's not doing it as much as she thinks she is.



Monitors medicines and other healthcare products used by the patient at a regular basis and makes recommendations for improvement to the patient and other healthcare professionals as appropriate. So, she just needs – she thinks she's doing it a lot more than I think she's doing it. She needs to make sure she's really on the ball and doing it at all stages.

Scrolled down to each behaviour one by one and clicked to expand description.

Participant considered each behaviour in isolation in some detail before moving on to the next in the list.

Scrolled down to each behaviour one by one and clicked to expand description.

Participant considered each behaviour in isolation in some detail before moving on to the next in the list.

Scrolled down to each behaviour one by one and clicked to expand description.

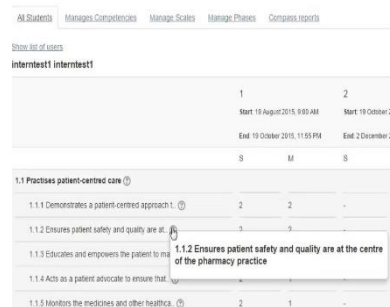
Participant considered each behaviour in isolation in some detail before moving on to the next in the list.

3. In some cases, participants expressed confusion about the intended meaning of the behaviour presented on Compass, but attempted to interpret it anyway, as it was required to progress.

I4: Screencast and Think Aloud

Time 00:02:40-00:06:23

Compass display



Speech

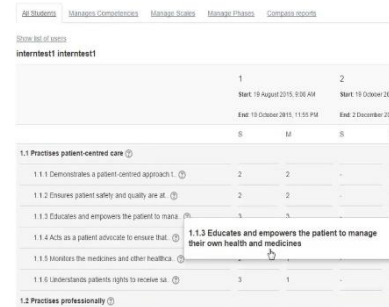
Ensures patient safety and quality are at the centre of pharmacy practice. Yeah, that one is kind of maybe a bit harder to demonstrate. Patient safety and quality are at the heart of pharmacy practice, because how do you show up qualities exactly? But I have myself a two, because obviously I do try to ensure patient safety, I'm not so sure about the quality bit of it. My tutor gave me a two as well for that, so that's good, it matches up.

Interaction with Compass

Scrolled down to behaviour, clicked question mark to expand the description.

Description

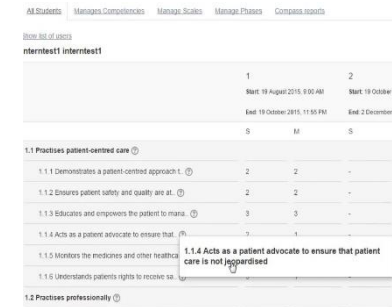
Participant scrolled down to behaviour. Noted that it was difficult to interpret, reviewed scores and moved on.



The next one is educates and empowers patients to manage their own health and medicines. Educates and empowers patients to manage their own medicines. I think that I obviously do educate people. The empowers bit? I don't know, I think it is a bit weird, hard to show maybe. I gave myself a three, so mostly occasional lapses. Hmmm. Empowers the patient to manage their own health, okay. My tutor gave me a three so that's good.

Scrolled down to behaviour, clicked question mark to expand the description.

Participant scrolled down to behaviour. Noted that it was difficult to interpret, reviewed scores and moved on.



Okay ...and acts as a patient advocate to ensure that patient care is not jeopardised. this one is a bit strange. Acts as a patient advocate. I mean sometimes there's not much opportunity to demonstrate that all of the time but I gave myself a two, much more haphazard than mostly. Okay so my tutor gave me a one, so very rarely meets the standard expected. Okay I think that's difficult to demonstrate, acts as a patient advocate.

Scrolled down to behaviour, clicked question mark to expand the description.

Participant scrolled down to behaviour. Noted that it was difficult to interpret, reviewed scores and moved on.

4. Participants generally considered each individual behaviour in isolation rather than considering them as part of an overall structure on Compass. However, one participant took an alternative approach, using Compass to look through the behaviours at the level of the competencies first, before going back to review them all individually.

I5: Screencast and Think Aloud

Time 00:02:06-00:02:27

Compass display

	S	M	S
1.1 Practices patient-centred care			
1.1.1 Demonstrates a patient-centred approach 1	2	2	-
1.1.2 Ensures patient safety and quality are at...	2	2	-
1.1.3 Educates and empowers the patient to mana...	3	3	-
1.1.4 Acts as a patient advocate to ensure that...	2	1	-
1.1.5 Monitors the medicines and other healthca...	2	1	-
1.1.6 Understands patients rights to receive sa...	3	1	-
1.2 Practices professionally			
1.2.1 Carries out duties as a pharmacist in a p...	2	3	-
1.2.2 Demonstrates awareness of the position of...	2	2	-
1.2.3 Treats others with sensitivity, empathy...	3	3	-
1.2.4 Takes responsibility for their own action...	1	3	-
1.2.5 Maintains patient confidentiality	2	2	-
1.2.6 Obtains patient consent as required	2	2	-
1.2.7 Recognises their scope of practice and th...	3	3	-
1.3 Practices legally			
1.3.1 Understands and applies the Pharmacy Act	2	3	-

Speech

First you should have a flick through them overall. First one, practice patient-centred care. Generally match above what tutor gave me, except a bit lower on the last three.

Interaction with Compass

Scrolled down through behaviours, scanning the ratings.

Description

Participant scrolled down quickly through the behaviours and estimated similarity or difference in individual behaviours to summarise at level of competency.

1.1.1 Demonstrates a patient-centred approach 1	2	2	-
1.1.2 Ensures patient safety and quality are at...	2	2	-
1.1.3 Educates and empowers the patient to mana...	3	3	-
1.1.4 Acts as a patient advocate to ensure that...	2	1	-
1.1.5 Monitors the medicines and other healthca...	2	1	-
1.1.6 Understands patients rights to receive sa...	3	1	-
1.2 Practices professionally			
1.2.1 Carries out duties as a pharmacist in a p...	2	3	-
1.2.2 Demonstrates awareness of the position of...	2	2	-
1.2.3 Treats others with sensitivity, empathy...	3	3	-
1.2.4 Takes responsibility for their own action...	1	3	-
1.2.5 Maintains patient confidentiality	2	2	-
1.2.6 Obtains patient consent as required	2	2	-
1.2.7 Recognises their scope of practice and th...	3	3	-
1.2.8 Maintains a consistently high standard of...	2	3	-
1.3 Practices legally			
1.3.1 Understands and applies the Pharmacy Act	2	3	-

Practice professionally – similar enough. Practice legally – similar.

Scrolled down through behaviours, scanning the ratings.

Participant scrolled down quickly through the behaviours and estimated similarity or difference in individual behaviours to summarise at level of competency.

1.2.4 Takes responsibility for their own action...	1	3	-
1.2.5 Maintains patient confidentiality	2	2	-
1.2.6 Obtains patient consent as required	2	2	-
1.2.7 Recognises their scope of practice and th...	3	3	-
1.2.8 Maintains a consistently high standard of...	2	3	-
1.3 Practices legally			
1.3.1 Understands and applies the Pharmacy Act	2	3	-
1.3.2 Understands and applies the requirements...	2	1	-
1.3.3 Demonstrates an awareness of other lega...	2	3	-
1.3.4 Demonstrates an understanding of the lega...	2	2	-
1.3.5 Demonstrates an awareness of and adhere...	3	3	-
1.4 Practices ethically			
1.4.1 Understands their obligations under the p...	2	4	-
1.4.2 Makes and justifies decisions in a manne...	2	3	-
1.4.3 Recognises ethical dilemmas in practice s...	2	3	-
1.5 Engages in appropriate continuing professio...			
1.5.1 Understands and accepts the importance of...	2	2	-

Practice ethically – lower. Engages in appropriate and continues professional development – lower.

Scrolled down through behaviours, scanning the ratings.

Participant scrolled down quickly through the behaviours and estimated similarity or difference in individual behaviours to summarise at level of competency.

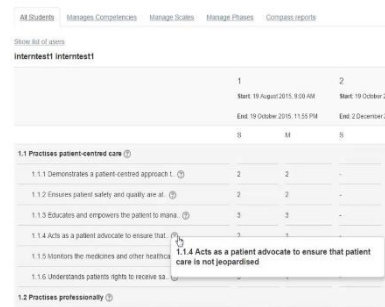
5. Where the intern and tutor saw similar scores, they tended to pay limited attention to the behaviour and moved on quickly. When difference was identified, interns and tutors noted it and considered why it might have arisen, generally considering that it needed to be discussed at the face-to-face meeting.

I6: Screencast and Think Aloud

Time

00:01:58-00:02:25

Compass display



Speech

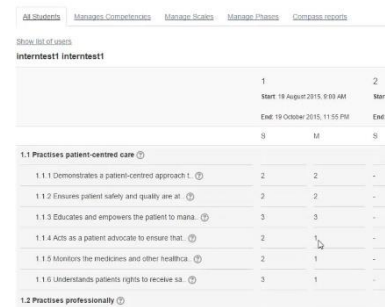
Acts as a patient advocate to ensure the patient care is not jeopardised.

Interaction with Compass

Participant scrolled to behaviour, looked at the ratings, then clicked on the question mark to expand the description.

Description

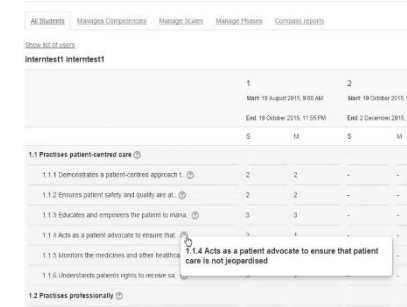
Participant identified a discrepancy then evaluated why the difference occurred, and planned to ask about the score.



A two, and a one. In this instance, I'd have to question why I was given a one, I feel I gave myself a two.

Participant hid the descriptor and considered the ratings again.

The expanded description had obscured the ratings so the participant closed it to see them again.



I feel that I do that actually. I do actually act as a patient advocate.

Participant re-expanded the description and stated their view before moving on to the next behaviour.

The participant looked at the description again to reconsider their own score.

6. In some cases, the difference observed on compass was attributed to the stage of the year (this data represented the first assessment of the year), or confidence instead of competence

I1 (Screencast and Think Aloud)

Time 00:00:09-00:00:26

Compass display

	1	2
	Start: 19 August 2015, 9:00 AM	Start: 19 October 2015
	End: 19 October 2015, 11:55 PM	End: 2 December
	S	M
1.1 Practices patient-centred care		
1.1.1 Demonstrates a patient-centred approach to...	2	2
1.1.2 Ensures patient safety and quality are at...	2	2
1.1.3 Educates and empowers the patient to mana...	3	3
1.1.4 Acts as a patient advocate to ensure that...	3	2
1.1.5 Monitors the medicines and other healthca...	2	1
1.1.6 Understands patients rights to receive sa...	3	1
1.2 Practices professionally		
1.2.1 Carries out duties as a pharmacist in a p...	2	3
1.2.2 Demonstrates awareness of the position of...	2	2
1.2.3 Treats others with sensitivity, empathy...	3	3
1.2.4 Takes responsibility for their own action...	1	3
1.2.5 Maintains patient confidentiality	2	2

Speech

Now let's see, a two and a one, monitors medicines and other healthcare...

Interaction with Compass

Scrolled down list to behaviour

Description

Participant scrolled down to behaviour, a discrepancy in ratings was identified and read the visible part aloud

	1	2
	Start: 19 August 2015, 9:00 AM	Start: 19 October 2015
	End: 19 October 2015, 11:55 PM	End: 2 December 2015
	S	M
1.1 Practices patient-centred care		
1.1.1 Demonstrates a patient-centred approach to...	2	2
1.1.2 Ensures patient safety and quality are at...	2	2
1.1.3 Educates and empowers the patient to mana...	3	3
1.1.4 Acts as a patient advocate to ensure that...	3	2
1.1.5 Monitors the medicines and other healthca...	3	1
1.1.6 Understands patients rights to receive sa...	3	1
1.2 Practices professionally		
1.2.1 Carries out duties as a pharmacist in a p...	2	3
1.2.2 Demonstrates awareness of the position of...	2	2
1.2.3 Treats others with sensitivity, empathy...	3	3
1.2.4 Takes responsibility for their own action...	1	3
1.2.5 Maintains patient confidentiality	2	2

1.1.6 Monitors the medicines and other healthcare needs of the patient on a regular basis and makes recommendations for improvement to the patient and other healthcare professionals as appropriate

... which is this one [clicks to expand description] and makes recommendations for improvement to the patient and other healthcare professionals as appropriate...

Clicked on the question mark to bring up the expanded description

Participant clicked the question mark to expand the descriptor, and read the rest of the descriptor

	1	2
	Start: 19 August 2015, 9:00 AM	Start: 19 October 2015
	End: 19 October 2015, 11:55 PM	End: 2 Dec
	S	M
1.1 Practices patient-centred care		
1.1.1 Demonstrates a patient-centred approach to...	2	2
1.1.2 Ensures patient safety and quality are at...	2	2
1.1.3 Educates and empowers the patient to mana...	3	3
1.1.4 Acts as a patient advocate to ensure that...	3	2
1.1.5 Monitors the medicines and other healthca...	2	1
1.1.6 Understands patients rights to receive sa...	3	1
1.2 Practices professionally		
1.2.1 Carries out duties as a pharmacist in a p...	2	3
1.2.2 Demonstrates awareness of the position of...	2	2
1.2.3 Treats others with sensitivity, empathy...	3	3
1.2.4 Takes responsibility for their own action...	1	3
1.2.5 Maintains patient confidentiality	2	2

... I suppose so, I suppose so, I was only starting out I guess.

Clicked on area away from description to hide it

Participant hid descriptor and considered the situation again, before moving on

The approach outlined above is representative of how the interns and tutors used Compass during user testing. The screenshot sequences provide details as to how they interacted with Compass and the think aloud narratives indicate their thought processes as they did so. Participants confirmed that this approach was representative as to how they would have completed the review of the scores in practice. No technical difficulty of any kind was encountered by any participant.

Most interns and tutors started at the top of the list with behaviour 1.1.1 and continued down through the behaviours until they reached the end. They reported that this was reflective of what they did in practice.

Start at one, what did I think, click each one, see what it says...[I5, interview]

Yep, I'd start at the top and work the whole way down. Considering each line separately...I kind of always thought of it all separately... [T1, interview]

Started at the top of the list displayed on Compass and worked down through the list individually [Secondary contradiction; rules vs object]

In practice, both interns and tutors also focused on differences in ratings during the review of the ratings on Compass, tending to be less concerned about any that did not differ, which tended to be the majority of ratings. Those that differed substantially were considered especially important for review.

I would have had a look myself before [meeting] with my tutor, I would have kind of just glanced through and seen any differences. But when you ask, most of them were the same, so there would only be a handful that were different. [I4, interview]

There were differences here and there. I suppose what she put down, the different numbers she put down, were the ones I expected her to put down, because I remember at the time when I was doing my first thing, a huge thing was that I wasn't confident enough to do it, and all the numbers that were down

Interns and tutors prioritised differences when reviewing the ratings using Compass. Differences were not common.

[low] were indicative of that. So that's low, but I expect it to be that way. [T5, Interview]

I would also focus on where they under-marked themselves so for example, takes responsibility for their own action and for patient care. They think they are really bad at that [one], whereas I think at that particular time they are decent enough [three], almost there, and certainly not a one. [T3, interview]

The purpose of reviewing the WBA data using Compass was to prepare for the meeting to discuss overall performance. The data should therefore reflect the competence level of the intern at the time of the WBA. However, there were some indications that this may not be being done in practice, with time being a primary reference point for some tutors and interns.

Acting as a patient advocate to ensure patient care is not jeopardised. The student has given herself a one, I gave her a two, em again she wouldn't have had any opportunity to jeopardise patient care yet, [T4, think aloud]

I just kind of read down through them, I was really cautious like for the first appraisal. Kind of gave myself a lot of twos, because I don't know. You kind of want somewhere to go from there. You don't want to – you're not going to go straight away and give yourself all threes. [I4, interview]

I tried to be honest with myself...if I considered myself to be strong on something then I wouldn't give myself that level of a mark, you know, recognising that it's first phase...maybe you are that strong it is but like you still have lots to learn so I didn't give myself any fours for example in the first one. I would limit myself to two or three you know. Because there is always room for development isn't there? That was the approach I took. [I2, interview]

For the first appraisal I wouldn't be too keen on them marking themselves as a four for anything and if they did and I didn't agree with that, I would question that [T3, think aloud]

Ratings from WBA seemed to focus on time rather than level of competence [tertiary contradiction, time-based (historical) approach vs competency-based approach]

Interns and tutors felt that this part of the WBA was helpful in preparing them for the meeting, and as a way to identify and keep track of areas for development and progress. Some felt less certain about its value, but all reported completing it.

You have to say they [reviewing the ratings] did really, you knew what you had to work on. They were a chore to get through but they helped identify what you had to do next, what you had to focus on...The whole idea would be to figure out where the numbers differed, why they would have differed, what I need to work on from that. [I1, interview]

I would try and improve on things I'd score low on if there were any big glaring kinds of things. [I3, interview]

I'd say to her it is here to keep us both on track so if you are finding something harder then it's reminding me to keep an eye on you and check in with you and see if there is anything I can do to help you out, but confidence comes with time, a lot of this will come with time. A lot of times they are shooting for the stars and want to be on the ward, and I'd be like this is boring but important. You don't want to be emptying totes but if you don't put the [medicine] in the fridge, its two grand, so who is paying for that. I'd be like it's boring, but don't mess it up. And it's an opportunity to talk...[T4, interview]

Participants appeared to find the review of the ratings on Compass a useful element of the WBA, though not all agreed it was very useful [possible secondary contradiction, rules vs object]

Interns and tutors described problems that they had using Compass in practice as they were explaining how they completed their WBA, but these issues did not arise during the user testing.

I found the Compass tool really difficult to use [when reviewing the ratings] for example the way that [question mark] is there and you held the cursor over it to pop up the full text, that was excruciatingly slow and the amount of times I'd end up getting logged out, or something happened just because it took such a long time for it [the full text of the behaviour] to come up to read it, whatever laptop or PC I was on, I couldn't read the full line... [T4, interview]

Compass created problems rather than facilitating the review of ratings smoothly [primary contradiction within tool]

After they had completed the required task using Compass, participants were shown how to use the Visualisation Tool (approximately five minutes) and asked if they were clear or needed any further information. This was important to ensure that they would not run into technical difficulties while using the Visualisation Tool. The aim was to have them feel comfortable with using it so that they could review another set of data in a similar manner to the above. Once they were comfortable, they were asked to review another set of simulated data using the Visualisation Tool.

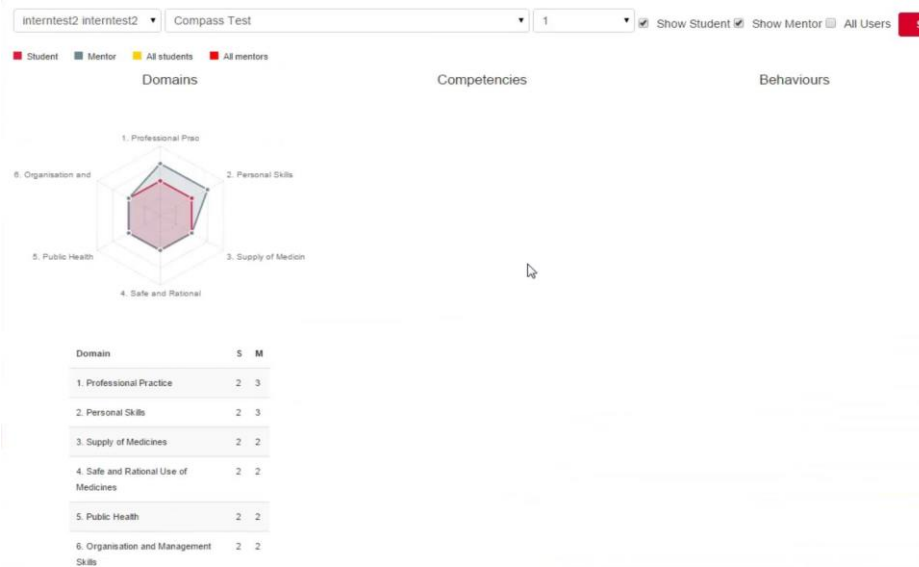
Visualisation Tool

1. Once interns and tutors had been shown how to use the Visualisation Tool, they were asked to review another set of data in a similar manner, this time using the Visualisation Tool as a starting point. Rather than going line by line, participants started with an overview of the situation before moving on to competencies relating to a domain.

I5 (Screencast and Think Aloud)

Time: 00:14:52-00:15:38

Visualisation Tool Display:



Speech: Okay starting off, I can see that for the domains six, five, four, three, my tutor and I are lined up much the same, where I think I am. Although for domains one and two they have put me further along which is obviously good.

Interaction with Visualisation Tool: Read the ratings as presented on the Visualisation Tool.

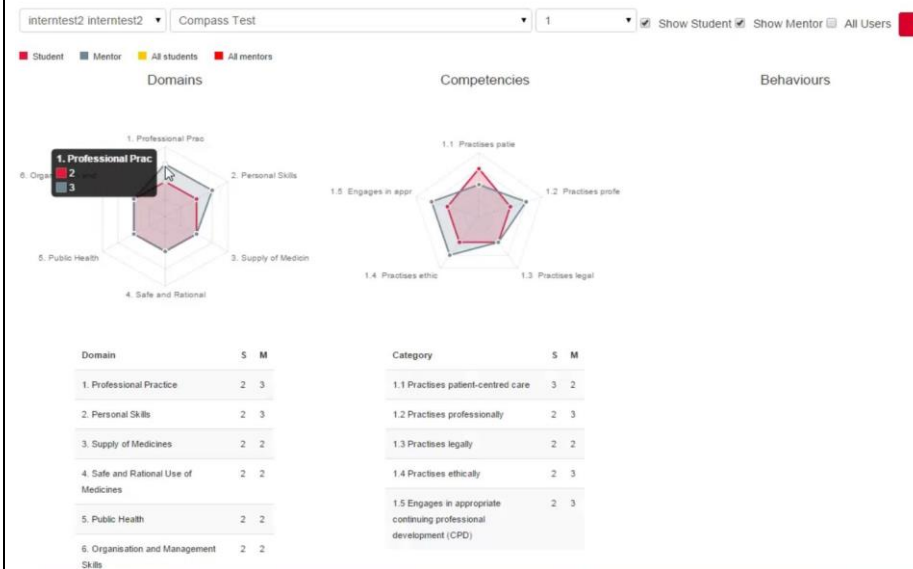
Description: Started the review of ratings with consideration of the overall performance at domain level.

2. Next participants selected one domain and considered the competencies

I5 (Screencast and Think Aloud)

Time: 00:15:39-00:16:09

Visualisation Tool Display:



Speech: So I'll just take the first one. So for the first one, professional practice, it's interesting it's not as simple as it first looks. I gave myself higher for practices patient-centred care overall than my tutor gave me, but for everything else I either scored better than my tutor or the same. Okay let's see.

Interaction with Visualisation Tool: Clicked on the interactive point on the graph for Domain 1, to show the competencies. Looked at the graph and identified that for all but one competency (Practices patient-centred care) the tutor had rated the same or higher.

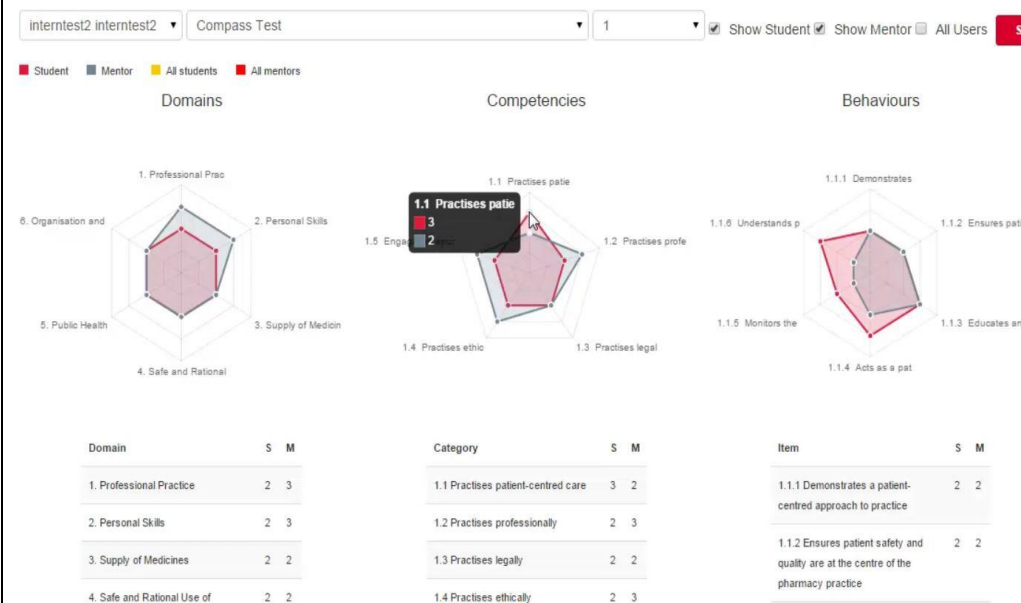
Description: Moved from the domain level to competency level and reviewed the differences and similarities.

3a. Next, participants selected a competency to focus on and considered the behaviours.

I5 (Screencast and Think Aloud)

Time: 00:16:10-00:16:21

Visualisation Tool Display:



Speech: So for practice patient-centred care so for 1.1.4, 1.1.5, 1.1.6

Interaction with Visualisation Tool: Clicked on the interactive point on the graph for competency 1.1, to show the behaviours. Looked at the graph and identified that for three competencies, the intern had rated themselves higher.

Description: Moved from the competency level to behaviour level and assessed the differences.

3b. They scrolled down to see the information in the key below when necessary.

I5 (Screencast and Think Aloud)

Time: 00:16:22-00:16:53

Visualisation Tool Display:



Speech: So for all of those. Acts as a patient advocate, monitors the medicines and other healthcare needs on a regular basis, understanding patient rights to received safe and high quality healthcare including pharmacy care, all of those I scored myself higher then, so I guess those are the things I might bring up. Everything else is fairly well in line.

Interaction with Visualisation Tool: Scrolled down to see the full behaviours relating to the points on the graph. Read them, then scrolled back up to move on to the next competency.

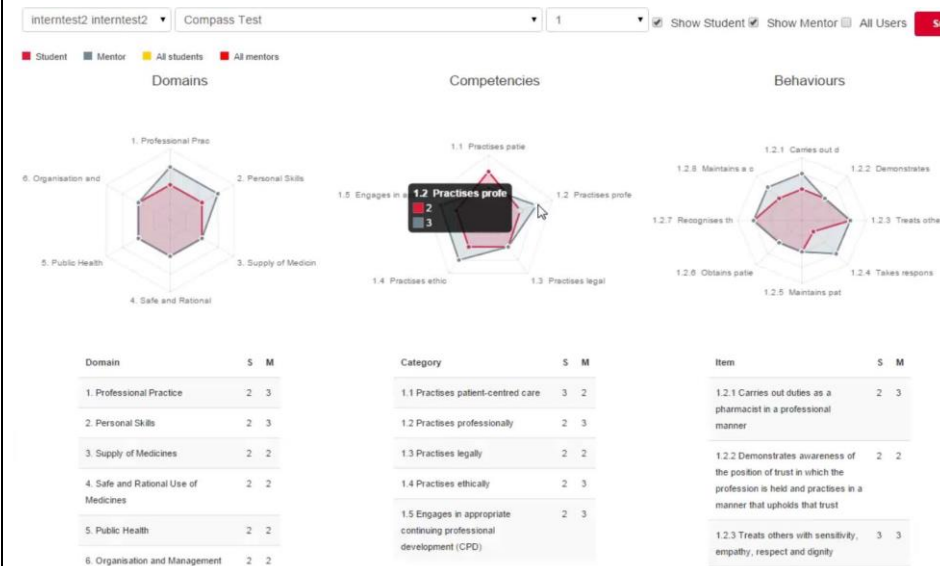
Description: Moved from the domain level to competency level and assessed the differences identified. Made a plan to discuss them with tutor.

4. They scrolled back up to move on to the next competency and repeated the same process.

I5 (Screencast and Think Aloud)

Time: 00:16:54-00:17:07

Visualisation Tool Display:



Speech: So for competency practices professionally. Everything is either in line with them or they ranked me a bit higher

Interaction with Visualisation Tool: Scrolled down to see the full behaviours relating to the points on the graph. Read them, then scrolled back up to move on to the next competency.

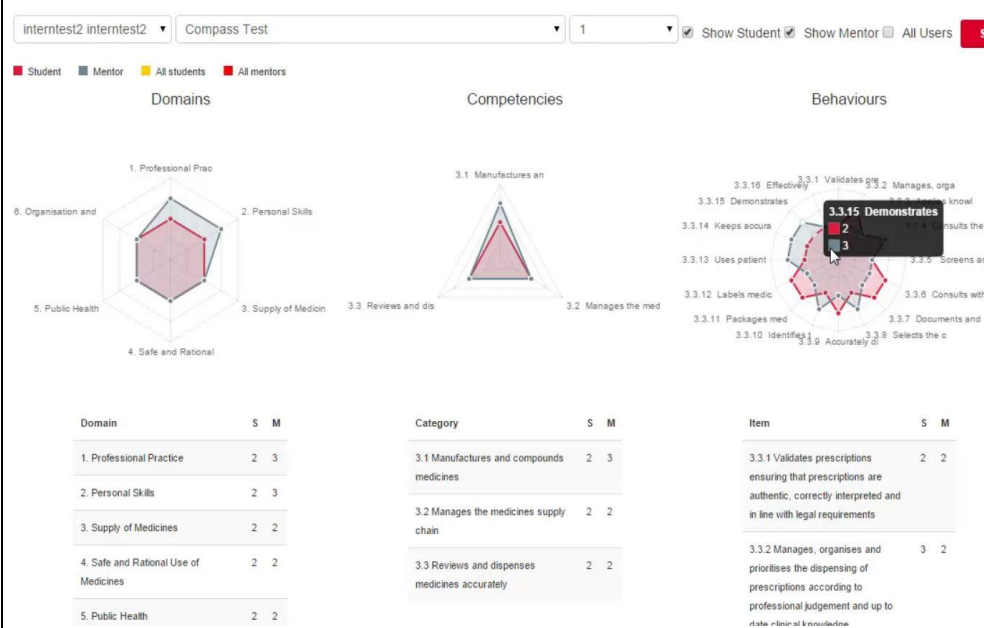
Description: Moved back to the competency level, selected the next one sequentially and reviewed behaviours. As none were considered problematic (i.e. they had not rated themselves higher for any behaviour than their tutor) they moved straight on to the next competency.

5. Some participants initially expressed opinions about the perceived complexity of the radar graphs, but proceeded to review without difficulty.

I3 (Screencast and Think Aloud)

Time: 00:44:17-00:44:33

Visualisation Tool Display:



Speech: Reviews and dispenses medicines accurately...wow...there is a lot going on here. Validates prescriptions...

Interaction with Visualisation Tool: Clicked on the interactive point that represents competency 3.3 to bring up the graph with behaviours.

Description: Clicked on competency 3.3 to expand the behaviours and perceived the graph to be complex. Proceeded to work down through the behaviours without evident difficulty.

All participants were able to use the Visualisation Tool without difficulty. Some of the participants seemed slightly hesitant when initially using the Visualisation Tool, and some expressed surprise when faced with the shapes (e.g. “Wow” [I3, think aloud]) as shown above, and some felt that initially negative towards it (e.g. “I suppose initially when I clicked on it I didn’t overly like the look of it. Once I got into it, it was actually fine” [T4, interview]). Most expressed preference for the Visualisation Tool over Compass and explained why this was the case for them.

I think it is when you saw the screen, it seemed to be – in your head you’re like, is this never ending? And I know we were told that there are 178, you have to get level four for all of them, but at the same time, I think this is broken up nicely so you can see, as I say, you are making progress. So I think it is very good. [I6, interview]

It’s good that you can get an overview at the one time. Rather than a big list of stuff. Because I remember when I was reading it with my tutor you know you kind of go for your first ones in detail, then you just start running out of time towards the end so you’re just like okay all the rest of them are fine. So at least this one you can skip between the areas a bit better, and probably get through them all better. [I4, interview]

Visualisation Tool helps break up the long list of behaviours and make them more manageable

You've done this already so you are only revisiting it, so you would straight away go to areas where you have had a discrepancy. There is no point going through sixty data points again if you have given her the same score. It's quicker and less straining on your eyes than to be looking at binary code of ones and twos basically. I think it needed improvement. It was nearly a deterrent how slow it was [...] It was heart-breaking. [T4, interview]

I think it is better, and I am going to use it with [current intern] to link it up. I want her to be like, these are the domains, competencies and behaviours you'd expect of a pharmacist, and I am going to use it. I will use it like this [without the graph, using the key only]. Otherwise you are just reading it line by line, I am going to use it. [T1, interview]

Yes, [I would go through Compass] line by line by line. But the second one definitely cut all that out because you could see it instantly, like it was just one map over another map. You know, it was a whole picture. So it presented the information that led you to look at it as a whole picture and then look at the individual parts. Rather than looking at the individuals and trying to build a picture. [I2, interview]

I felt that looking at the domain and the competencies was a much more global impression. Then it was just going into the behaviours to kind of nit-pick [T5, interview]

For me, it showed me more where we were the same. My tendency would be to focus on where we were different. It reflected back more to me the doing well part. As opposed to the not doing well part. [I2, Interview]

Visualisation Tool facilitates the representation of the natural hierarchy of the CCF and helps avoid reductionism

Helped focus on the similarities as well as the differences

Many participants recognised that while the Visualisation Tool would help them at the review stage, it would not address all the challenges they had encountered when using Compass, as they would still be required to individually enter ratings for each behaviour using Compass before the data could be visualised.

You're gonna have to input a massive amount of numbers, there is no way around it. [I5, interview]

The behaviours are still really annoying; I suppose you can't do anything about that? [I4, interview]

The competencies are there, they have to be done...Now whether you use the information-based [Compass] or graphs you are getting to the same spot in the end. You still have to enter the same amount of data, you still have to go through each one so it won't materially change the amount of work you have to put into it, the only thing it will do is show a visual distinction, you want the person to be well-rounded at the end. [T3, interview]

Recognition that the first step of using Compass where the intern and tutor individually rate the CCF behaviours was still going to be a requirement

5.5.4 Summary

This part of the research focussed on how Compass and the Visualisation Tool were used by interns and tutors to review ratings using an activity theory-based user testing approach. In section 5.6 below, the focus moves to the how these tools were used during the review meeting using practice observations. The findings from the user testing are combined with those from the practice observations and discussed in terms of how they address chapter objective in section 5.7 below.

5.6 Compass and Visualisation Tool Use During Review Meetings

Having considered how Compass and the Visualisation Tool was be used by interns and tutors in preparation for their meeting in a simulated environment, the next step was to consider their use in the review meeting itself. From a WBA perspective, such meetings are considered key for the provision of feedback and guidance to the intern on areas for development (Holmboe, 2015). Observations were conducted with one tutor and intern pair using Compass, and two intern and tutor pairs using the Visualisation Tool. Data were collected by video-recording participants during their review meetings. The approach taken is described in detail below.

5.6.1 Theoretical Considerations

From an activity theory perspective, the role of the investigator is ‘to vicariously experience, make sense of, and become able to report participants’ lived experiences’ (Yamagata-Lynch, 2010, p. 65). Observing participants in their usual setting while they completed their meetings was therefore an ideal approach to collect data for this study. It would enable collection of data about how Compass and the Visualisation Tool were used by interns and tutors in real settings, and how these tools served to meet their requirements (Vrazalic, 2003b).

I recognised that it would be very challenging to simulate a review meeting in a similar manner to that used for the independent rating review (described in Section 4.4.2.1 above). Rather than being completed individually, the review meetings themselves involved the tutor and intern in the workplace. This would be very challenging to replicate meaningfully. Therefore, this double-stimulation experiment was planned differently. Instead of asking participants to participate in a simulated user testing experiment, a modified double-stimulation method was designed where participants were observed directly as they completed their review. Rather than having to disrupt the meetings to ask the intern and tutor to switch tools, I decided that each pair would be asked to use either Compass or the Visualisation Tool (not both) during their meeting and that the differences between the various meetings would be considered to establish the ZPD in relation to the review meetings.

5.6.2 Participants and Procedures

5.6.2.1 *Participants*

Participants were considered eligible to participate if they met the same criteria described in Section 4.4.2.1. The aim for this part of the study was to recruit a

minimum of one intern and tutor pair using Compass, and one using the Visualisation Tool. While this aim may appear modest in ambition, it was anticipated that there would be challenges recruiting participants for this part of the study. Therefore, it was planned to triangulate this data so conclusions would not be drawn from this element alone. Ultimately, one review meeting using Compass and two using the Visualisation Tool were recorded. My experience reflects known challenges with gaining access to workplaces to conduct video recordings is also generally considered to be challenging (Heath, 2010, pp. 14-20).

5.6.2.2 *Ethical Considerations*

As the research involved the recording of participants, ethical approval was sought from Lancaster University. Participants were invited to take part via an email with a participant information sheet attached (Appendix 3). They were asked to respond if they were interested in taking part in the study, and completed a consent form before participation. Consent was needed from both the intern and tutor for participation. Particular ethical considerations apply to collecting data in workplaces, particularly health care environments, so particular care was taken to ensure any information relating to patients was not recorded by the cameras. Ensuring anonymity of participants when using video recordings is challenging. In this thesis pixilation is used to address this issue in images, and any identifiable names of people or places are removed from transcripts (Heath, 2010, p. 30).

5.6.2.3 *Physical Environment*

Pharmacies tend to have very limited space, with small areas (if any) dedicated to staff meetings. Therefore, in this research, one meeting took place in an office/store room, one in the dispensary when the pharmacy was closed, and one in an office that was so

small three people could not physically fit into the room, so I could not directly observe participants during their meeting which represents a limitation as no field notes could be taken. The practical constraints of these environments made identifying where to place cameras particularly challenging. Multiple fixed position cameras were used to capture the computer screen as well as the participants' discussions (Heath, 2010, p. 54). Three recording devices were used. A GoPro Hero4 Silver® and Canon LegriaHF R606® camcorder were used to record the participants during the meeting, and an iPad Mini® was used to record the computer screen. As the devices needed to be placed in a variety of places (on top of medicines shelves, on small ledges, on doors etc.), JOBY® tripods were used to enable the devices to be angled in response to the constraints of the physical environment (see Fig. 5.4) to get the best possible video footage for analysis.



Figure 5.5 Positioning the Recording Equipment to Record Screen.

Upon my arrival at the pharmacy, a preliminary discussion regarding the practicalities of recording took place and if necessary permission was sought to move various

objects to facilitate recording device placement. Next, the participant information leaflet was discussed and participants were invited to ask questions. The consent form was then signed by participants. The recording equipment was set up, and participants were asked to proceed with their review meeting if they had no further questions.

5.6.3 Data Analysis and Findings

The same approach to analysis as described in Section 5.5.4 was followed. The preliminary review data are presented below in Table 5.3.

Table 5.3 Preliminary Review Data from Practice Observations

Practice Observation	Location	Time	Field Notes/Comments
Practice Observation 1 (PO1) [Compass]	Community pharmacy, Co. Cork, Ireland	1h 27 minutes	Review meeting took place in an office/storage area to the back of the dispensary in the pharmacy. Difficult to find suitable areas to place the cameras initially. Very thorough review meeting, tutor inputted grades using a laptop computer as the meeting went on, though had decided on the scores previously.
Practice Observation 2 (PO2) [Visualisation Tool]	Community pharmacy, Dublin, Ireland	1h 2 minutes	Review meeting took place in a pharmacy as it was closed for lunch. Very little time to set up equipment as the review needed to be completed within one hour as the pharmacy would re-open. No office/meeting room so meeting took place in the dispensary.
Practice Observation 3 (PO3) [Visualisation Tool]	Community pharmacy, Dublin, Ireland	1h 10 minutes	Review meeting took place in a very small area of the pharmacy between the dispensary and the patient consultation room. Unable to sit with the participants due to space constraints. One camera appears to have fallen over during the meeting but other recording devices captured the rest of the session so there was no issue. No field notes.

5.6.3.1 *Compass Use During the Review Meeting*

The first practice observation took place in a community pharmacy in a rural area in the south of Ireland. The review meeting took place in a small office/storage area to the back of the pharmacy. Three recording devices were placed at various points in the area, providing three angles for data collection (Fig. 5.6).

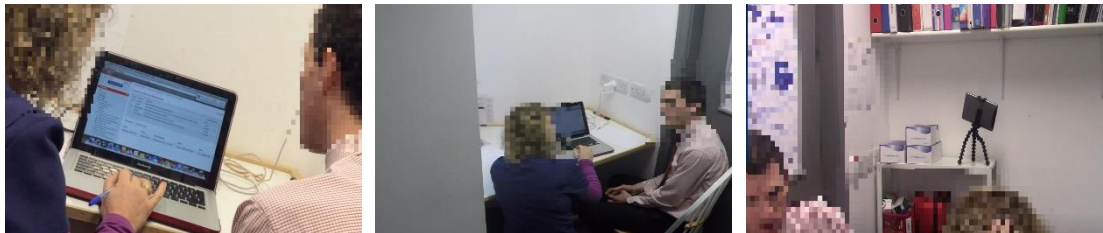


Figure 5.6 Recording Device Placement to Record Multiple Angles

The intern and tutor accessed Compass on a laptop computer during the meeting. They remained sitting focussed on the laptop throughout the majority of the review meeting. Compass was used to structure the review meeting, and the intern and tutor discussed the intern's progress on each behaviour in turn. In this case, the tutor had considered her ratings before the meeting, but entered them as the review meeting proceeded using notes she had made on paper. The tutor controlled the laptop for the majority of the meeting, inserting her ratings as the meeting proceeded. Below, I outline in detail how Compass was used during the review meeting, primarily considering how Compass acted as a mediating tool, and what contradictions were evident (Vrazalic, 2003b). The findings are presented below and discussed in section 5.6. As some of the discussion was lengthy [...] is used to indicate where some text has been omitted deliberately

Intern-Tutor Pair 1 Practice Observation

Time	Speech/interaction
00:00:53-00:01:04	T: So we will go through the first section now. A patient centred approach [behaviour 1.1.1]. Well obviously that's grand.

I'd be giving you the same there anyway, obviously you're completely a customer person and patient oriented so that would be the same there.

Compass/Interaction



Notes

Tutor starts by reading the visible part of the descriptor aloud.



Tutor clicks on the dropdown menu and selecting the rating [a three]. The rating selected is the same as the intern's rating already entered.

Time**Speech/interaction**

00:01:15-
00:01:45

T: Educates and empowers the patient [behaviour 1.1.2].
Yeah I agree with you on the two there.

I actually went down into that. Health and medicines.
You're probably very good with helping them to manage
their medicines. Sometimes when it comes to health. It's a
thing we will be covering anon.

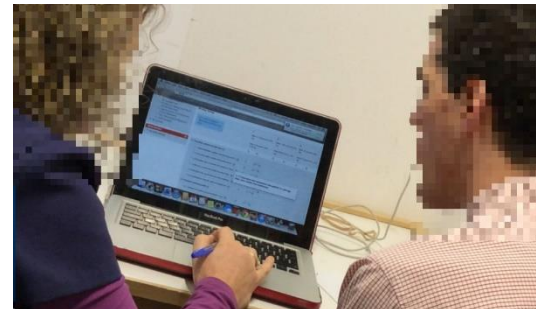
I: Mmmmmm

T: You know looking at health is an holistic thing really

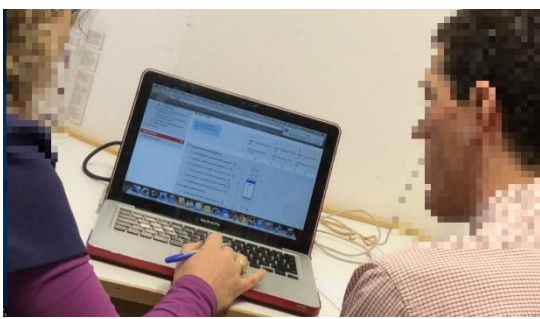
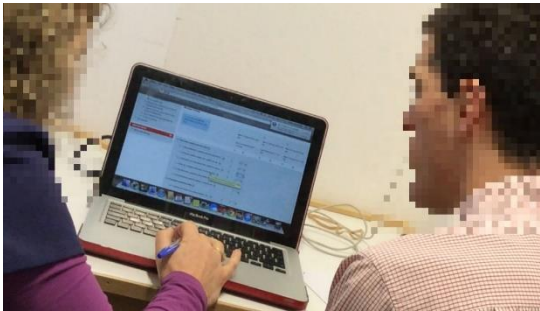
I: Yeah, yeah, yeah

Compass/Interaction**Notes**

Tutor reads the part
of the descriptor
visible on screen.



Tutor expands the
descriptor, recalling
something to
discuss based on
her preparation.
She identifies that
the 'health' element
of the descriptor
was where her
concern lay.

Time	Speech/interaction	Compass/Interaction	Notes
<i>Contd.</i>	<p>T: So you know if you can bear that in mind going forward really, you know that you're watching their health as well as their medicine. I mean two there was right because yeah, that score there would have been what I was thinking of.</p> <p><i>I: Mmm [nods]</i></p>		<p>Tutor closes the expanded descriptor, and enters the rating [two] using the dropdown menu.</p>
<p>00:01:46- 00:02:02</p>	<p>T: Acts as a patient advocate to ensure that hmm... patient care is not jeopardised. Three is perfect you know because obviously that really falls in under the first one you know. A patient centred approach. Really you know, that you're thinking of the best interests of the patients all the time.</p> <p><i>I: Oh right okay.</i></p>		<p>Tutor moves on to the next behaviour, reads it partially aloud, realises she does not know the full behavioural descriptions so clicks to expand it. Enters her rating [three] using the dropdown menu (not shown).</p>


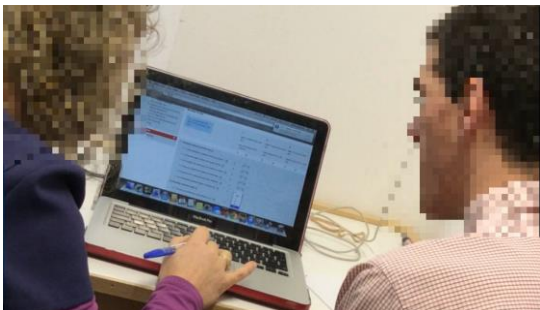
Time	Speech/interaction
00:02:03-00:04:07	<p>T: Sometimes I have to scroll over these because I can't remember what they are. Healthcare needs on a regular basis. I'd be going sort of two there as well. There's an awful lot happening on that line [behaviour] really.</p> <p><i>I: Mmmm</i></p> <p>T: Now if you have any feelings on what I'm saying, butt in you know.</p> <p><i>I: Oh no, I'm good so far you know.</i></p> <p>T: Monitors healthcare needs on a regular basis. You see you're not here long enough to say on a regular basis anyway, you're only seeing people maybe two months at this stage, in fairness you are getting to know them at this stage. That rating would be a sort of haphazard approach really, it only happens sometimes. Two I would agree with that.</p> <p><i>I: It would only be if it was a big issue I'd take it on, but if it was something small you see that I mightn't even notice, I'm not taking it on then you see, so that's why I was saying something like a two.</i></p>

Compass/Interaction



Notes

Tutor recognises that she does not know the full descriptor by heart so clicks to expand it. She uses a pen to point to it on screen reads it partially, and remarks that it is complex. A longer discussion of the behaviour ensues with reference to the specific context of the intern, tutor, and pharmacy itself.

Time	Speech/interaction	Compass/Interaction	Notes
00:04:08-00:04:30	T: Knowing the patient's right to receive...yeah three there.		Tutor moves on to the next behaviour, reads it partially aloud, agrees with the score, enters hers [three] and tries to scroll down to the next competency.
	T: What's going on here now		Instead of scrolling down, the dropdown menu is selected, so the score is increased to four, and scrolling is no longer possible. The tutor recognises an issue.

Time **Speech/interaction**
Contd. *I: Maybe if you click out here [points]*
 T: Click out here and then scroll down, oh yeah

Compass/Interaction



Notes
The intern identifies that the issue relates to the rating dropdown being selected, and suggests the tutor click outside the rating dropdown to enable scrolling. The issue is resolved.

00:04:31- T: Yeah three is perfect there.



Tutor scrolls down to show the next competencies and behaviours and continues the review

The intern and tutor worked through all of the behaviours similarly, discussing each in turn. Where there was a discrepancy in the rating, this was discussed, and highly context-specific examples were provided. There were no other instances of difficulty with the technical use of Compass. The computer screen remained the focus of both participants for the majority of the discussion, with very occasional instances where they sat back and engaged in slightly longer discussions. The tutor provided lengthy, detailed examples for the intern, and made notes for follow up. The tutor also provided explanations for the ratings, often relating them to her own performance, expectations, or time.

T: You'd be three borderline four really, but you know sometimes giving four to somebody in the beginning you know. There's always shortfalls, like even if I was doing it myself there I'd probably be reluctant to give myself four, because there is always something you can do better to strive to be a better pharmacist. So like you could have got four there, but three is probably realistic [Tutor].

Rather than relating the rating to the criteria on the scale, the tutor appeared to use self-reference to determine the rating for behaviour 1.2.2 relating to trust based on perceived limitation of the scale [secondary contradiction rule vs object]

T: Until you've probably worked for a year, you come across so many situations that you nearly want that tiny bit extra. If I was doing it for myself I'd probably give a three there because sometimes I think I miss out on things, you know if you are busy and you sort of forget, or sometimes you prejudge you know [...] you must think of it from their perspective as well.

As well as self-reference, here the tutor refers to the need for time for interns to experience multiple situations to show competence in behaviour 1.2.2 relating to treating others with empathy [tertiary contradiction; new vs old systems]

They generally agreed on ratings. Where there was a difference, the tutor generally rated the intern lower. In a number of cases, the intern tried to explain his perspective. One example where the intern attempted to explain why he had rated himself a four on a behaviour relating to consent is provided below.

T: Consent, that was one of the ones I was thinking maybe I didn't know if you had come across it much yet you see [intern rating 4] [...] I'm not even sure if you have come across a situation yet [...] I'll just make a note [...].

I: I was thinking it only happened once and I got the consent which was basically about a phone call and I asked could I actually ring your doctor [...]. That was the only time so I thought one hundred per cent of the time I had to do it I did it. But I know where you are coming from.

T: Like I might be going a two there. Now that is not a reflection on you doing anything bad, it's just you haven't come across enough situations. Does that sort of make sense.

The intern had rated himself in accordance with the rating scale, assigning a rating of four because he had demonstrated the required behaviour in the one and only time it arose. The tutor felt that this rating was too high as he had not yet experienced enough instances to say he was competent due to limited time in the training establishment [primary contradiction within rating scale; lack of clarity]

Where relevant, the tutor highlighted resources in the pharmacy that might be useful to the intern as he aimed to achieve level 4 in particular behaviours.

T: Understands and applies Irish and European pharmacy law. Three is grand, there is always scope to know a tiny bit more I suppose. If I was doing this myself I'd be putting a three as well. You know the way every now and again you actually have to go back to the book to try and figure out. Actually you know the book of SOPs [standard operating procedures] up there, we have them all printed out you know in the back of that as well you know the extra things like optometrists and things that you might not come across [...]. I know you did it in college, but sometimes you forget unless you are doing it every day of the week.

The tutor provided a specific example of some material that might help in the context of their particular training establishment.

This approach continued and the intern and tutor used Compass to work through all of the behaviours. For some of them, it appeared the intern and tutor appeared to be unclear about the intended meaning of the descriptor.

T: That might be a three actually, they are probably talking about one or two different areas where there might be a pharmacist involved, where if Mrs. Brown gets her medicines and it's home delivery if she needs to ask questions and there's nobody there to ask questions [...].

I: Yeah, I didn't understand that fully.

The intern and tutor struggled to understand behaviour 3.2.7 (relating to Good Distribution Practice) in the context of their workplace [secondary contradiction; rules vs object]

5.6.3.2 *The Visualisation Tool in the Review Meeting*

The second and third practice observations, which took place in community pharmacies in Dublin, focussed on the use of the Visualisation Tool in the review meeting. As with the previous practice observation, several recording devices were used to collect data. The second practice observation took place in the dispensary (Fig. 5.7) and the third in a very small meeting room (Fig. 5.8). Findings are presented in turn below, and discussed in section 5.7.

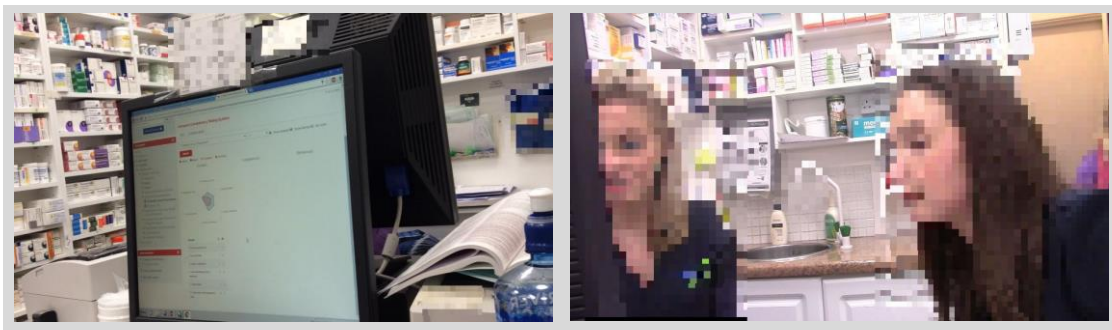


Figure 5.7 Recording Practice Observation 2 in the Dispensary

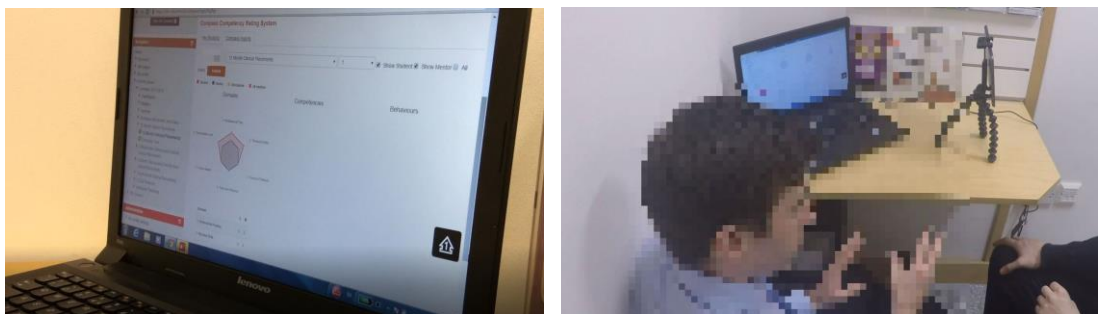
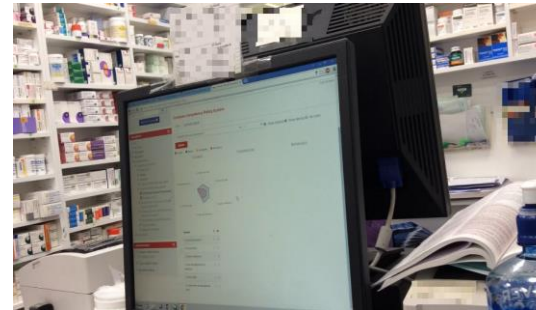


Figure 5.8 Recording Practice Observation 3 in the Meeting Room

Intern-Tutor Pair 2 Practice Observation

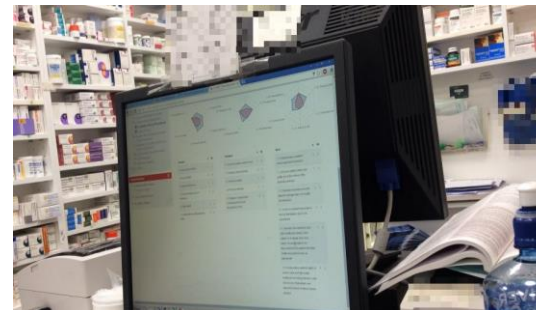
Time	Speech/interaction
00:01:55-00:02:06	T: Is this your one now? [Screen showing Visualisation Tool] <i>I: Yep</i> T: Did you do them like this? <i>I: Yeah I did them in sections, and then there were certain points I had kind of picked out</i> T: Yeah <i>I: Like I know I don't do this or...</i> T: Yeah
00:02:40-00:03:10	T: Do you want to be on this side or if you want me to move to the other side I don't mind. <i>I: I don't mind</i> T: Will I put the mouse in the middle so we can both scroll though it? <i>I: Yeah, great.</i> [Tutor checks with me regarding positioning]

Visualisation Tool/Interaction




Notes

Tutor started by confirming that they had both taken the same approach [using the Visualisation Tool]

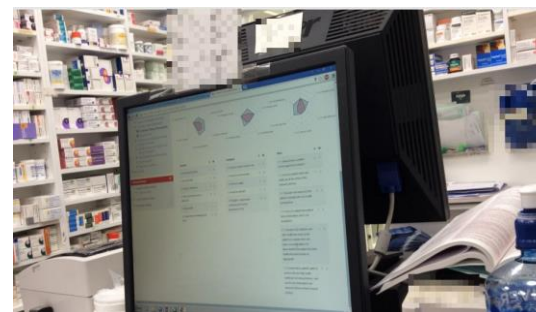


Tutor sets up screen to show Domain 1, Competency 1.1 on screen and they agree how to arrange seating/computer use etc.

Time	Speech/interaction	Visualisation Tool/Interaction	Notes
00:03:11-00:04:39	<p>T: So it's your first appraisal, so first of all, with all of this aside, I just want to say that you have done really well so far. Obviously you've been here for quite a few years [...]. So rather than learning how to file invoices, you are now learning how to become a pharmacist, so you've done really, really well with that.</p> <p><i>I: Thank you</i></p> <p>T: I find you a really good help in the shop [pharmacy], without you I'd be lost, and there are lots of different areas you completely look after, and that's really good, particularly at this stage of the year. So thank you for that.</p> <p><i>I: Thanks</i></p> <p>T: Obviously, then we have the competencies, the competency framework that we have to fulfil in order to sign you off as a four at the end so you can become a pharmacist. So we will probably just go through that piece by piece. Okay is there anything you'd like to say at this stage?</p> <p><i>I: No, I'm okay</i></p> <p>T: You happy enough?</p> <p><i>I: Yes</i></p> <p>T: Yep okay, we will talk about anything personal to you after this meeting if that's okay. Do you want to start with the first one?</p> <p><i>I: Yea</i></p>		<p>Tutor provided an overview of her assessment of the intern's performance to-date before moving on to the competency framework. During this discussion, the intern and tutor looked at each other rather than the computer screen.</p>

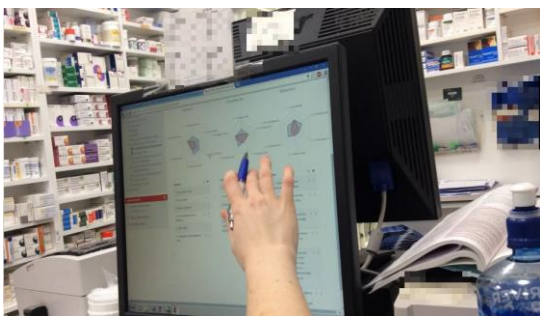

Time	Speech/interaction
00:04:40-00:06:40	<p><i>I: Yeah I was having a look [looks at notes] and I think for one or two of them I feel I rely on you and [other pharmacist] an awful lot, like I'm always double-checking with you guys. I don't think that's a bad thing but I think because I know I can check with yourself or [other pharmacist] I don't complete a circle of okay, what's my outcome going to be and then come to you so I think that's why I marked myself down compared to what you gave me [looks at screen].</i></p> <p>T: [Looks at screen] Okay, yeah. So is there anything we can do to help that then?</p> <p><i>I: I think it's just that I need to not rely on going to yourself or [other pharmacist] first, and try to figure it out myself first [...]. If there is a script that there is no rush on maybe just give me a chance to see if I can work it out like you used to do with [previous intern] [...], then maybe ask.</i></p> <p>I: Perfect, so like we are only in our third month as well so but I suppose I have to bear in mind that you are different to other interns because you are already very confident at using the computer systems, so in previous years I would have been wondering are they even able to type the label [...]. So like we did this morning if I stand back a little bit longer and you call me when you are ready for your check would that work?</p> <p><i>I: Yep, I'm happy with that [...]</i></p>

Visualisation Tool/Interaction



Notes

The intern had come to the meeting with her own notes prepared, and referred to them when asked to start. The screen remained on Domain 1, Competency 1.1 during this part of the discussion, but was not referred to specifically.

Time	Speech/interaction	Visualisation Tool/Interaction	Notes
00:06:41-00:08:15	<p>T: So I've just written down a few things, I can't recall which section it comes from, but what I did was focus on anything where I had scored you higher than you had actually scored yourself. So I think what I am trying to do at this stage is give you confidence. So that next time perhaps both of our scores will be at the same level [points at difference in shaded areas on screen].</p> <p>So one of the points here is ensures patient safety and quality [behaviour 1.1.2; tutor rating 2, intern rating 1] and I have just written down three points that are so vital to this pharmacy. The error log that you've changed and made much more adaptable to us that we fill in more efficiently and fill in every time, and it's brilliant, it's really good and as a supervising pharmacist that means that part of my job is done and I know you've helped me really well with that [...]. The date-checking matrix [...] that you do unprompted every month [...]. Where you've identified where you make mistakes like the Nuprin versus NuSeals, you've put a label on the shelf so these little things that you might not think are important are hugely important to your role, my role, everybody else's role and ultimately to the patient.</p> <p>I: <i>Mmmm</i></p>	 	<p>The tutor referred to her own notes, indicating that in the visualisations, it was evident that her scores were higher than the interns, which she associated with a lack of confidence. She provided examples of good practice by the intern as evidence to support her rating. For the majority of the discussion they looked at each other.</p>

Time	Speech/interaction
00:08:16-00:09:57	<p>T: One of the sections in this [tutor glances at screen], just an area or improvement ,is to learn and apply Irish law, so I think we should work on that [behaviour 1.3.2; tutor rating 1, intern rating 1].</p> <p><i>I: Yeah that was one thing I don't think I'm strong on even from doing the assignment in MP1 [module 1]. When you looked over my assignment you were like that's not right.</i></p> <p>T: Okay, yeah with the diazepam</p> <p><i>I: Yeah so I know I'm not very strong on that and I know we were supposed to look over that during MP1 but I guess I didn't manage my time well enough to get it done.</i></p> <p>T: There's lots of things to focus on in that particular assignment anyway, and it was your first assignment, and a group assignment, so there were lots of challenges there. Anyway, you've got through it, [...] but you still know that you have to expand on and learn more knowledge and that's important that just because you've passed that doesn't mean you've done it, that's really good [...]. We will put that as a focus over the coming weeks. I think I also have to do a full SOP (standard operating procedure) review.</p> <p><i>I: That's what I was wondering, would I be able to help you with that. Because it might refresh my memory of the SOPs ad even some of the law that's around it [...].</i></p> <p>T: I've a note made about that on my list, that's one of the things I thought might be really helpful to me and you [...] and in your future roles as well and in an interview [...].</p>

Visualisation Tool/Interaction



Notes

The tutor glanced briefly at the screen to check the rating for behaviour 1.3.2 on the Visualisation Tool which she had noted as requiring attention.



The rest of the discussion did not involve the screen/Visualisation Tool.

Time	Speech/interaction
00:09:58-00:13:04	<p>T: One of the things I've written here in terms of professional practice is to let your personality out more. If you allow that as you become more relaxed – because you have the personality for the job, you're a kind and caring person, you know what tone to speak in, you know when to step back, you know when someone wants to speak in private, all of that. They're key things that you can't really learn [...] and if you allow your lovely personality to come through more to patients, they'll bond with you and trust you [...]. Is there anything else you wanted to say about this section?</p> <p><i>I: Yeah, about standard of work [behaviour 1.2.8; tutor rating 2, intern rating 1]. I think I'm good for a little while then like with the high-techs, I let that slip this month and we didn't have stuff on the shelf that we should.</i></p> <p>T: Okay</p> <p><i>I: Different things like that you know, not keeping up to date with claims, I felt this month I didn't do that as much as I would have other times [...]</i></p> <p>T: Can you think of any reasons why you forgot this month?</p> <p><i>I: I think it was just particularly [...], it was just a busy month I guess because it generally doesn't happen.</i></p> <p>T: Exactly, it is the first time that it has happened [...] We will work on that.</p>

Visualisation Tool/Interaction



Notes

The tutor raised the issue of personality from notes rather than from the Visualisation Tool as it is not technically part of the core competency framework.

Once this discussion was completed, the intern moved the conversation back to discussing specific behaviours.

The intern and tutor continued to work through the competencies in this manner.

Instead of going through each behaviour, line by line, they used the Visualisation Tool as a reference point during their discussion, but spent most of their time on particular behaviours identified by the intern and/or tutor and agreeing plans for development.

T: So will we move on to the next one? So supply of medicines (domain 3) [clicks on competency 3.1]. How did you feel about that?

I: I guess this was to do with compounding, calculations and stuff so I guess we don't do a whole lot of compounding. Even when we do, I guess I'll always ask you like how many mls [...] so I suppose like we were saying about leaving me to do scripts if there is one maybe leave it to me, those patients generally don't wait.

T: So I'll step back there, and obviously you wouldn't proceed until you get the sign-off

I: No, no, everything gets checked anyway.

The intern noted that she felt that she did not have much opportunity to demonstrate competence in compounding medicines, but linked back to a previous idea where she suggested that the tutor allowed her to attempt any prescriptions that required compounding on her own first, before reviewing them.

They discussed specific examples relating to the competencies where relevant. For a number of the competencies, it was identified that there would be difficulty in demonstrating frequency of behaviour as the behaviours did not necessarily reflect the day-to-day activities of the pharmacy.

T: Is there anything else in that section you wanted to talk about?

I: The only thing I had was about my calculations [...] but I suppose there's not much I can do in work for that because there's not much calculations, but I know if I was stuck I could always come in and ask. So I'm just working on that myself [at home].

T: Well I don't get any exposure to that either [...]. So if you bring them in and we work through them together or as a group then I would be more than happy to help with that. Even helping you that time with that diazepam assignment [...] it was reassurance that I am teaching you the right stuff, so I would love to be involved more in that element, because we get nothing as a tutor, about that.

Referring to behaviour 3.1.2 (which pertains to pharmaceutical calculations) the intern felt that she did not experience sufficient numbers of examples to develop competence. In order to address this, the tutor suggests that the intern brings her notes to work so that she can receive necessary help [primary contradiction; competencies as rules vs not all competencies being relevant]

After all the competencies in the domain had been reviewed, the tutor used the Visualisation Tool as the basis for a summary of the intern's progress, pointing to specific elements on the screen which were relevant to the points being verbalised.

T: Under the supply of medicines, again, we haven't done too badly, I've just marked you up on this section [moves pointer over competency 3.2], but we more or less agree on this section [moves pointer over competencies 3.1 and 3.3]. Your date check, order check, high-tech and now ULM [unlicensed medicine] check – which you are slightly competent and again, we will do that again before Christmas – they are reliable and that is really important. We had one slip, slips happen, it was picked up on, and we move on, because that is really important, everyone makes mistakes. And there's lots of different reasons why things can slip through, as long as you know you've a good team behind you we should always be able to work these things out [...]. It is as a whole very reliable and that's important. Competency 3.3 reviews and dispenses medicines accurately. We will improve on this through allowing you to self-check and hope to see a reduction in any errors or near-misses that occur, so that again is with time. You've completed one section of your internship, we are now into the next section.

The tutor used the Visualisation Tool to help summarise the discussion relating to Domain 3. She indicated to the intern which competencies she was referring to using the pointer and referred to the behaviours beneath the radar graphs when she wanted to be more specific about particular competencies.

The same process was used to complete the rest of the review meeting, no difficulties using the Visualisation Tool were evident. Towards the end of the consultation [01:00:19] the meeting was interrupted by arrival of other staff members due to start work [this review meeting was scheduled to take place while the pharmacy was closed as the dispensary was needed]. Therefore, the intern and tutor had to rush through the behaviours in Domain 6 narrowing quickly to the key areas. With the time for discussion reduced, the tutor took charge of prioritising the remaining behaviours and summarising the review meeting from her perspective, before hurrying away to deal with the waiting patients [quaternary contradictions; the requirement to do the WBA vs the requirement to provide professional pharmacy services in the workplace]

Intern-Tutor Pair 3 Practice Observation

Time **Speech/interaction**

00:00:32- T: So this is the first of your competencies. We're going to
00:01:08 start this and obviously this is from your first three or four
 months of working so basically as you know we've done the
 grading, most of them are fairly similar. Em, but basically
 it's your first grading so after three months you're obviously
 not going to be up in the higher bracket for most things so
 not to worry about that, you're making good progress. We'll
 start ahead so.

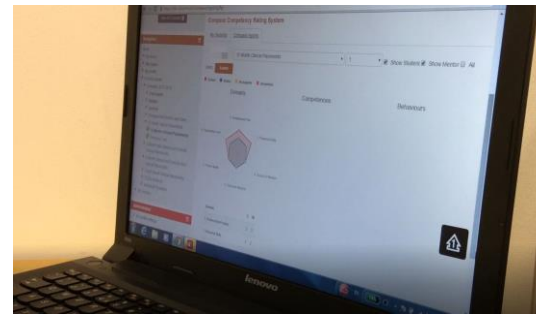
I: Yeah

T: So we're just going to work through these [points at
screen], start with them one at a time, then break them down
and go through each point.

I: Yeah

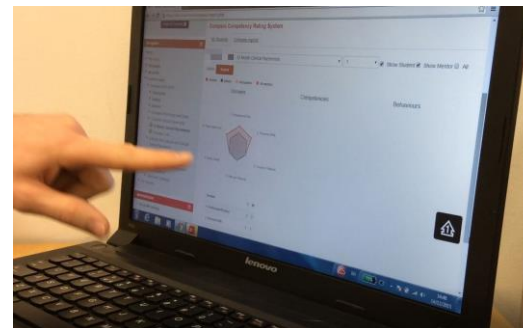
T: I think that's the main thing is really that we'll have a
chat about mainly where the differences are in those ones.
There are a few, but we will get going on this.

Visualisation Tool/Interaction



Notes

The tutor set out the planned process for the review meeting. The Visualisation Tool was open at the domain level.



Time

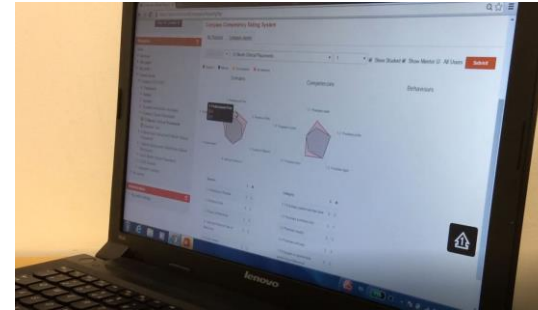
Speech/interaction

00:01:09-
00:01:52

T: We'll get going on this [clicks on domain 1 on the Visualisation Tool].

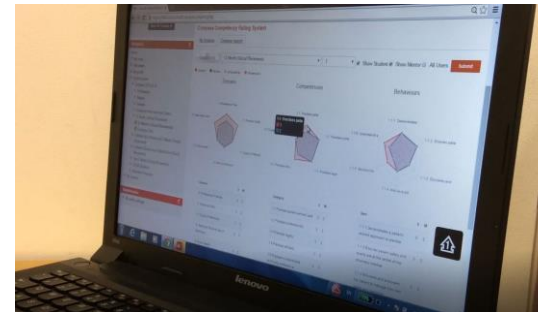
Visualisation Tool/Interaction

Notes



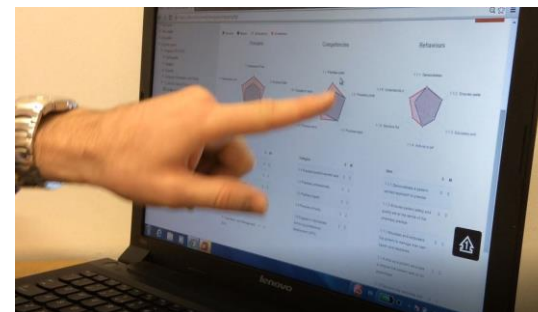
The tutor used the Visualisation Tool to display the competencies relating to domain 1.

T: I'll start at the top of this one too. [Clicks on competency 1.1]



The tutor clicked on competency 1.1 to display the related behaviours.

T: Okay so patient-centred care is the first one we have broken down here [scrolls down, points to behaviours relating to competency 1.1 screen]. So again, we are kind of agreeing on the vast majority of those ones. So a patient-centred approach to practice so that obviously in your day-to-day work [...]. I've given you a three out of four so you know you're almost there, you're doing that consistently [...]. Same with safety and the quality [behaviour 1.1.2].



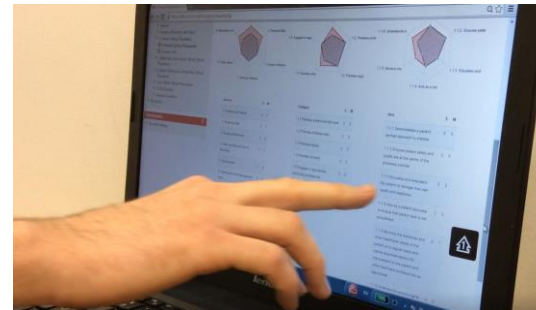
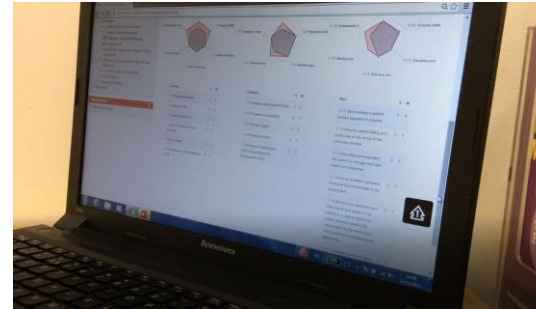
The tutor used the structure visible on the screen to show the

Time**Speech/interaction**

00:01:53-
00:02:53

T: Now, educates and empowers the patient to manage their own health and medicines [looks at screen]. Now we've both gone with two here. I guess for the start you have been basically inputting prescriptions, preparing prescriptions, where I would be generally bringing them out and you would be kind of more observing me. In the vast majority of cases. You have given out some of them, so it is just a matter of me moving that along now because you've shown that you are fairly competent in running them through and things like that, so we'll get you bringing them out more. You have been watching me kind of going through and again you have been doing them, but again with regards to the counselling, things like that to make sure, you know again [points towards behaviour 1.1.3 on screen again] educates and empowers. So you know that you are giving the proper directions to everybody and you know making sure that they understand. So that's probably why we are down in the twos there. It's just kind of getting feedback from the patients is always very important, so you know, going forward it's something to focus on.

I: *Focus on, yep*

Visualisation Tool/Interaction**Notes**

The tutor stops to discuss this behaviour in detail. Despite both rating the intern at level 2, the tutor identified this behaviour as an area that required more attention.

Time**Speech/interaction**

00:02:54-
00:05:32

T: Monitors the medicines [scrolls down to read full behaviour] and other healthcare needs of the patient on a regular basis and makes recommendations for improvement to patients and other healthcare professionals as appropriate. So we have a bit of a difference there [behaviour 1.1.5; tutor rating 1, intern rating 2]. Em for the nursing home side of the business you're quite good at that side of things, ringing doctors and things like that. Again it's more for people walking in to the pharmacy.

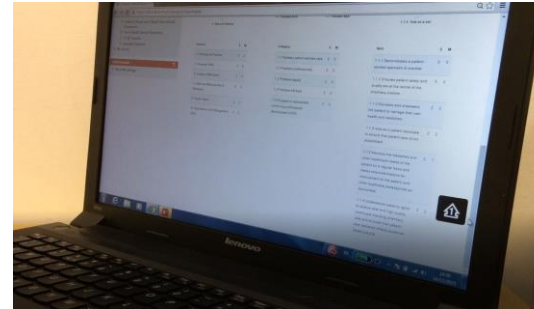
I: Walking in yeah

T: Where I'm seeing, when you are putting through, say a repeat, printing off prescriptions things like that, it's just having the awareness that it's not just what you are giving, it's what else might be on the patient history and being mindful of that.

I: And aware of [drug] interactions, stuff like that.

T: Exactly, yeah so we have come across a few instances where there was a change, maybe a single script was given between a three-monthly where doses might have been changed and that wasn't seen at the time.

I: Yeah, yeah

Visualisation Tool/Interaction**Notes**

Time**Speech/interaction**

Contd.

T: So it's just to bear that in mind. It's something that's very important [...]. It's kind of a common error, when there's changes made in between regular prescriptions.

I: That's unlike nursing homes where you have a Kardex [type of prescription] and you have a dose change.

T: Yeah, they're telling you exactly, whereas the patient who is walking in, they're kind of expecting and rightly so that they're bringing in a prescription with a change and you are recording the change.

I: Yeah

T: So it's up to you to check the history when you are doing it. Just bear that in mind from that aspect.

I: [...] If I get a script that I see there is a dose change, I can put a comment on the thing or something like that, would that help?

T: You can do that, there's popup features available on the system [...]. What I find best though is before you go putting through any new medication that you look first at the dispensing history highlighting each thing [...]. The differences show up quite clearly.

I: It's attention to detail

T: It's attention to detail and keeping an eye on stuff

Visualisation Tool/Interaction**Notes**

As the discussion continued, the intern and tutor sat back from the computer screen and engaged in discussion about the particular behaviour.

Time**Speech/interaction****Visualisation Tool/Interaction****Notes**

00:05:33-
00:07:05

T: And again I was relating that to this last item [points to behaviour 1.1.6 on screen]. Understanding patients' rights to receive safe and high quality healthcare and ensure the patient care is delivered reflecting evidence-based practice.[...] pharmacy you have to give one hundred per cent high quality. There is no room for errors [...] As you said attention to detail is crucial and you cannot lapse in any way. Generally pretty good, you know it's only for three months, you've got a good few threes there and things [...].

I: I think I have improved on that even since I've filled that in. I've realised the competencies more so [...].

T: And do you find anywhere that you need extra help? Or do you think you're okay?

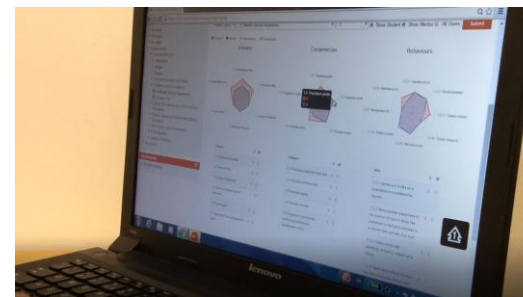
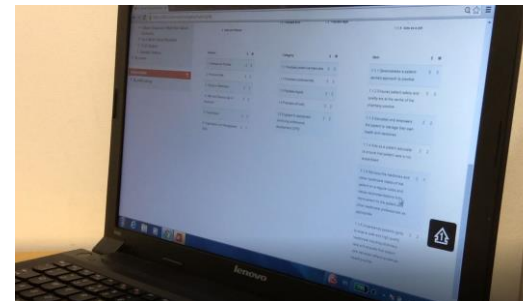
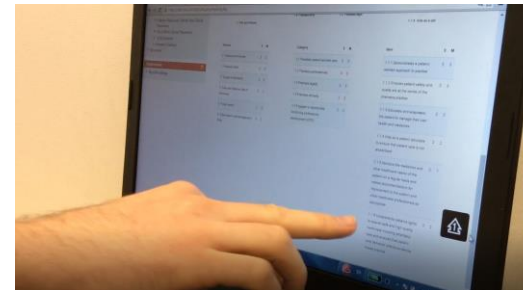
I: Not in that regard [...] attention to detail which is a good point I will take on board [...]. it was fair enough marking.

T: Okay perfect, yeah I think so too, like I say we have that one there [moves mouse to point to behaviour 1.1.5] [...]. I was relating it more to the people coming [than the nursing home] in because that's more practical, more that you are going to see in pharmacy and that's where we need to get working a bit more.

I: Yeah, and the pace when it gets faster and busier

T: That's the first lot so next, practices professionally. [clicks on competency 1.2]. So again, we are fairly in agreement I think.

00:07:06-



The tutor primarily directed the progress of the review meeting in a structured manner based on the Visualisation Tool. Working systematically, the intern and tutor used the Visualisation Tool as a point of reference during the review meeting and primarily focussed on areas where there was discrepancy in scoring. Even where there was agreement, in several instances, the tutor provided specific practical advice to the intern that was designed to help them develop.

T: Again, what I always think is, especially starting off, a good motto to have is that you never put through a drug [complete a prescription] that you don't know what it's for, and that you don't know the main details about. Not only for patient safety which is the first thing, but for yourself as well. And then so that when you are talking to patients that you can answer any questions that they have confidently. Obviously there are so many new drugs, and so many new ones coming on stream all the time, many you won't even see in practice, but it really is imperative you know exactly about what you are [dispensing]. You know what they are for, when they can't be given, interactions, that you're able to look up all of those points [...]. CPD [continuing professional development] is not just your Master's or going to formal training course days, it's even when you open the [books]. You're demonstrating that pretty well, you just need to maintain it.

For competency 1.5, the tutor provided practical advice to the intern regarding day-to-day rather than formal CPD engagement. He emphasised the role of informal and ongoing learning, which would likely have been overlooked by the intern as they were in the early stages of their training.

For some competencies e.g. 2.1 [leadership skills] the tutor noted the challenges of demonstrating these skills at an early stage in the internship.

T: Leadership skills, I presume it's kind of difficult when you are coming into a pharmacy as a new member of staff and being able to demonstrate leadership skills especially in your first three months. I think you've come into your own a bit more as you have gotten more used to both the staff and your surroundings and [...]way we do things here. You are coming into it a good bit. We are agreeing on most things here [looks at behaviours radar graph] [...]. Confidence as I keep saying is going to develop over time and it has improved greatly since when you started.

The tutor provided a general overview of his perspective on the intern's development of leadership skills before looking at the behaviours relating to the competency.

The tutor noted that certain competencies (e.g. relating to compounding in Domain 3) could not yet be discussed as there had not been an opportunity for the intern to engage with them.

5.7 Discussion of Findings

Three key findings from the user testing and practice observations are discussed below. These relate to the ZPD of the tool, the use of Compass by interns and WBA practice. Each is discussed in turn below.

5.7.1 Zone of Proximal Development

In the case of this research, the ZPD of the tool was defined as what the participants could do using the Visualisation Tool that they could not using Compass alone. The Visualisation Tool therefore took the role of ‘a more capable peer’ normally associated with ZPD experiments (Daniels, 2008, p. 127). The activity theory-based user testing approach described by (Vrazalic, 2003a, 2003b) was used to design the double-stimulation experiment. Findings revealed that The ZPD of the Visualisation Tool was identified as resulting in three primary elements. Using the Visualisation Tool enabled users to avoid reductionism to a greater degree, allowed them to ‘see’ what was happening more clearly and therefore interpret the data more meaningfully, and it allowed more efficient review of the ratings, enabling more in-depth conversations in the review meeting. Each is discussed in turn below.

5.7.1.1 *Avoiding Reductionism*

A key criticism of CBME and WBA is that it promotes reductionism. It is often suggested that checklist-based approaches promote inappropriate fragmentation of complex professional practice into a series of competencies or behaviours (Talbot, 2004). “Atomisation” of criteria should be avoided in CBME/WBA as it reduces the

validity of assessment (van der Vleuten & Schuwirth, 2005). The findings from the user testing and practice observations indicate that due to the manner in which the ratings are presented, using Compass seems to promote the consideration of the ratings in an isolated manner where the relationships between the CCF domains, competencies, and behaviours is lost. While frameworks with multiple hierarchical levels are considered to have practical constraints for users in most cases (Lurie, 2012), when using Compass in both the user testing and the practice observation almost all participants started their review at the first behaviour and worked down through them individually, with the interview data clarifying that this is what they had done in practice. When using the Visualisation Tool, participants in the user testing and practice observations considered the ratings in a way that better reflected the hierarchy and relationships between the domains, competencies, and behaviours. Participants were better able to discuss behaviours and competencies at a collective level and reported that starting from the perspective of an overview of the domains was an improvement. The fact that the radar graph-based Visualisation Tool helps to avoid this fragmentation reflects findings in similar studies (Keister et al., 2012).

5.7.1.2 *Interpreting the Ratings*

As well as helping to avoid reductionism, use of the Visualisation Tool also enabled the interns and tutors to more readily interpret the sets of ratings presented due to its radar graph-based design. Interns and tutors reported that they could “see” the differences easily when using the Visualisation Tool, and this was reflected in the think aloud data and interviews. This was not too surprising as one of the advantages of radar graphs is to facilitate interpretation of multivariate data more readily (Saary, 2008). The radar graphs allowed them to more easily identify the similarities and differences in ratings, and more easily understand the relationships between the

various elements. As one intern described, “[...] it presented the information in a way that led you to look at it as a whole picture and then look at the individual parts. Rather than looking at the individuals and trying to build a picture.” The think aloud protocol transcript analysis provided evidence that the use of the Visualisation Tool meant that participants approached reviewing the ratings in a qualitatively different manner, and suggested that it helped them adopt a more holistic perspective. Being able to easily identify discrepancies in ratings was considered an important concern, that allowed interns and tutors to target the specific areas readily. This feature of radar graphs was also found beneficial for competence assessment by Harrington et al. (2015).

5.7.1.3 *Efficiency and Use of Time*

Finally, the fact that the Visualisation tool promoted less fragmented and more holistic approach, combined with the ability to more readily interpret the data, led to participants reporting that they could review the data much more quickly. While this was interesting to note from the interviews after the user testing, it was not considered particularly important as a finding on its own. When combined with the practice observation findings, the potential importance of the increased efficiency became evident. In the practice observations where the Visualisation Tool was used, it was evident that the time saved was used to facilitate more in-depth discussion and of particular behaviours during review meeting. With feedback provision considered one of the most vital elements of WBA (Tekian et al., 2017), and time pressures were identified in Chapter 4 as a significant barrier to feedback provision, the fact that the Visualisation Tool increased efficiency through more specific focus on differences during the review meeting facilitated more detailed feedback provision was a key finding.

5.7.2 Use of Compass and the Visualisation Tool

As well as identifying the ZPD of the Visualisation Tool, activity theory principles were used to consider how well Compass with(out) the Visualisation Tool acted as mediators to help interns and tutors achieve their goals. According to Vrazalic (2003b), this approach avoids an overly narrow focus on specific features of technology sometimes associated with user testing (e.g. task analysis) and instead considers problems that manifest using the activity theory principles of contradictions, and activity/operations/actions.

Participants used Compass and the Visualisation Tool as a means to review the ratings and prioritise areas for discussion at the review meeting. During the review meeting Compass and the Visualisation Tool were used to guide and inform the discussion of the intern's competence. Therefore, it is evident that both Compass and the Visualisation Tool appeared to help interns and tutors achieve the object of the activity, but that the Visualisation Tool allows this to be achieved in a qualitatively different manner (Section 5.7.1). Using a more standard task analysis-based approach would have limited the focus to particular issues such as the time taken to complete the activity, number of errors made, or perceived ease of use, where both Compass and the Visualisation Tool would have scored similarly, as participants rarely experienced technical difficulty using Compass or the Visualisation Tool. One example of where difficulty arose was in the first practice observation described above, where one of the dropdown menus appeared to be 'stuck'. This led to the intern and tutor taking their focus away from the review meeting to address the issue (the operation temporarily became a conscious action) but it was quickly resolved as described above. In another case analysis of the think aloud protocol for the user testing, a participant appeared to indicate that some of the graphs were complex (e.g.

“there is a lot going on here”) and they appeared to have to put conscious effort into interpreting the graph (the operation became an action). No such problems were identified in the practice observations where use of Compass and the Visualisation Tool appeared to be at the level of operations. This may explain the intern and tutor’s lack of emphasis on WBA in the focus groups in Chapter 4. The user testing and practice observations have highlighted that Compass is central to the WBA practice, but that from an activity theory perspective, its use is at the level of unconscious operations. Therefore, it is possible that interns and tutors are so familiar with it that it has become ‘transparent’ in use (Roth, 2003).

5.7.3 Elaborating WBA Practice

The objective addressed in this chapter relates to considerations of how Compass and the Visualisation Tool are used as part of WBA. The data collection methods involved looking at how technology was used in close detail. The findings already presented and discussed in this chapter have achieved the objective of understanding how Compass and the Visualisation Tool were used. However, they also allowed further important insight into specific aspects of WBA practice. In Chapter 4, the interdependent relationship between the activity system components was noted, and the findings in this chapter highlight this in more detail. Compass and the Visualisation Tool are inextricably linked to the CCF, the rating scale, the review of ratings before and during review meetings (outlined above in Section 5.7.1). The CCF and rating scale are discussed in more detail below.

5.7.3.1 *The Core Competency Framework in Practice*

In Chapter 4, findings indicated that the CCF use appeared relatively unproblematic. Findings from this chapter reflect some of the concerns of WBA critics indicating that

participants encountered challenges interpreting the language in the CCF relating to several behaviours (Lurie, 2012; Lurie et al., 2011), and that not all of the behaviours in the checklist were relevant to all contexts (Lingard, 2009). A specific example highlighted during the practice observations related to compounding medicines in the pharmacy. Participants noted that this was such a rare scenario in contemporary practice that it was a challenge to assess, and needed to make specific plans to cover it as it was not ‘a naturally occurring regularity’ (Lurie, 2012, p.52). Findings from both the user testing and practice observation indicate that where a competency appeared unrelated to the daily practice in the workplace, it was considered more difficult to interpret and more time was spent reviewing it (e.g. the discussion relating to GDP in Practice Observation 1). During the practice observations it was clear that tutors identified areas for development that were not covered by the CCF, such as personality, confidence, and what Ginsburg et al. (2008) describe as the ‘ambiguity of practice’. This highlights how in some ways the CCF can be said to oversimplify the ‘messy’ elements of practice (Morcke et al., 2013). While Hodges (2006) had correctly cautioned that CBME and WBA would overlook difficult to measure constructs, it was evident that the tutors involved in the practice observations found ways to incorporate these issues into their review meetings although this is not an ideal solution.

5.7.3.2 *The Rating Scale in Practice*

While the findings from Chapter 4 suggested that the rating scale was generally unproblematic, they reported that it did not facilitate discussion of development beyond the level of competence. The focus on achieving a minimal level of competence has long been recognised as a potential issue for CBME and WBA (Norman, 2005). However, despite many other potential challenges identified in

Chapter 2, interns and tutors did not have particular concerns beyond their tendency to avoid giving ‘high’ ratings in self- or tutor assessments at the beginning of the year, indicating that they may have been struggling to move past the idea of norm-based assessment (Pereira et al., 2018). It was encouraging to note that in the practice observations, it was evident that the tutors linked their ratings to specific examples including quality of care where relevant (Kogan et al., 2014). They also provided extensive narrative feedback to the interns based on what the intern had done (CPM van der Vleuten et al., 2010) and facilitated discussion and clarification. In all cases, the intern’s perspective was sought to some degree and differences in ratings were addressed through discussion (Altahawi et al., 2012). The findings also indicated that interns and tutors often failed to apply the rating scale in the ‘objective’ manner intended. Several factors influenced this, including their own perspectives (evident in the example provided in Practice Observation 1) (Ginsburg et al., 2010), an inappropriate focus on time or stage of the year instead of observed behaviour (evident in several user testing and practice observations) (ten Cate et al., 2015b), and the burdensome requirement to complete such a lengthy assessment which required specific time to be set aside (Malone & Supri, 2012). From reviewing the data collected for this part of the study it appears that the rating scale lends itself to problems identified in the literature, and developing a construct-aligned scale that better reflected the role of the intern may be useful (Crossley et al., 2011; Ginsburg, 2011). Finally, the data in this chapter highlight that while the ratings are recorded using numbers, this does not fully represent the extensive consideration given to the review of ratings before and during the review meeting and the volume of specific narrative feedback provided during the review meetings observed. While it was not recorded, it was evident that the interns were receiving large amounts of

qualitative feedback in addition to their ratings. This is considered good practice (Ginsburg, van der Vleuten, & Eva, 2017; Hanson, Rosenberg, & Lane, 2013), however facilitating the recording of narrative comments while avoiding overburdening tutors with administration is known to be challenging (Malone & Supri, 2012).

5.8 Chapter Summary

This chapter aimed to address objective 2 of this thesis, *to explore how interns and tutors used Compass with(out) the Visualisation Tool as part of WBA*, and contribute to achieving the main aim of this thesis. Using the Visualisation Tool meant that interns and tutors were able to avoid the degree of reductionism evident with Compass, better interpret the ratings, and review the ratings more efficiently so that more time was spent discussing targeted behaviours during the review meeting. Use of the Compass and the Visualisation Tool was also explored and it was identified that both were used to support the review of ratings before and during the review meeting elements of the WBA without evidence of technical difficulty in the majority of cases. Finally, collecting this data with a more narrow focus on technology highlighted how tightly linked Compass and the Visualisation Tool is to other tools, particularly the CCF and the rating scale. The findings from the user testing and practice observations provided further clarity about the strengths and challenges of these tools in practice. In Chapter 6, these findings are discussed in the context of the overall study.

Chapter 6: Conclusions and Implications

The behaviours are still really annoying, I suppose you can't do anything about that? [I4]

6.1 Introduction

This chapter aims to draw together the findings of each of the study objectives in order to address the overall aim of this thesis. In the following sections, the key findings of the research are restated and their implications and contribution to WBA research and practice is highlighted. The strengths and weaknesses of the research is considered and consideration is given to future work that will be undertaken.

6.2 Synoptic Overview of Study Elements

Before proceeding to synthesise the findings in Section 6.3, in this section the findings from each study are considered individually. What they tell us about CBME and how this contributes to the literature are discussed.

6.2.1 Document Analysis

The activity theory-based document analysis provided a window into how interns and tutors learned about WBA, considered a key element of understanding practice (Nicolini, 2012). Interns and tutors were provided with separate sets of training materials. Each set of training materials contained references to a multitude of factors that constituted what the WBA 'should' be. The key findings are highlighted below.

6.2.1.1 Key Findings Relating to WBA/CBME

The training materials provided interns and tutors with information about how to complete their WBAs. An activity theory analysis of these findings enabled representation of this information as a series of interrelated elements. Shown in Fig

4.2, tutors and interns are required to draw together multiple elements to complete the WBA. In itself, this is not particularly surprising, WBA is generally considered 'complex', and it is partially on its complexity that its strengths as an assessment method sits. It is also evident from Fig. 4.2, that there are similarities and differences between the elements identified for interns and tutors, which appears initially somewhat predictable (Govartes et al., 2015). Moving beyond 'complex' and examining the differences in elements more closely however, it is evident that some appear potentially problematic. For example, interns appear to learn that their tutor's role is to complete their assessment, discuss their ratings, and give feedback when the intern asks for it. On the other hand, tutors are advised that their role is more wide-ranging, including to guide the intern through learning, providing leadership, feedback, and coaching, as well as completing the assessment. In addition, noteworthy discrepancies are evident in the 'partially shared' object. The documents analysed present the aim of WBA to the interns as allowing them to demonstrate sufficient competence to be allowed to progress to sit their licence examination. The tutors' materials suggest the aim is to support the intern in acquiring the competence required to be a pharmacist. Therefore, the only commonality between these two aims is that the intern is signed off at 'level 4'.

These discrepancies provide empirically based suggestions to help understand some of the key problems evident in the WBA literature. Differing expectations are known to be a source of conflict and confusion in WBA (Ginsburg et al., 2008; Ginsburg et al., 2009; Jones Jr et al., 2011; Altahawi et al., 2012). The document analysis identified that training materials may inadvertently contribute to this as seen with the division of labour element in this research. Similarly, presenting interns and tutors with information that suggests the goals of WBA are different (to interns the aim is to

move forward to sit their licence exam, whereas to tutors their aim appears to be more oriented towards training their interns to be future healthcare professionals). The resulting shared object 'sign-off at level 4' acts as a lowest common denominator, reducing the WBA to the 'tick-box' exercise feared by CBME critics (Lurie, 2012; Krupat, 2018).

6.2.1.2 *Original Contribution to the Literature*

The document analysis therefore contributes to the literature in two main ways. Firstly, the findings suggest that where training considers the interns and tutors separately, it may inadvertently cause differing expectations that can contribute to conflict and confusion. Therefore, instead of considering the intern and tutor as having distinct training requirements that should be met separately, positioning them as part of a shared system of WBA may help ensure that expectations are aligned, and facilitate the development of common training materials. Existing literature has primarily focused on faculty development and training assessors on specific elements of WBA (Holmboe et al., 2011; Pelgrim et al., 2011; Kogan et al., 2015). Therefore, this research draws attention to a gap in training that may have been overlooked to date.

Secondly, the findings provide a plausible mechanism for how initially well-intentioned WBA/CBME initiatives may become 'reductionist'. The NPIP WBA training materials indicate that the aims of the WBA practice are different for interns and tutors. The overlap in this case, is minimal, and reduces the common aim of the WBA to the intern being signed off at level 4. Therefore, the intern and tutor are working towards to this common goal, rather than the aims presented in their respective training materials. This suggests that further research is needed to see if this

is evident in other contexts and may explain how WBA/CBME becomes reductionist in practice. It also suggests that practitioners should examine how training materials present information to interns and tutors, and consider common training approaches (as above).

6.2.2 Focus Groups

The focus groups were designed to provide additional context to the findings from the document analysis based on the experiences of interns and tutors with experience of WBA. The key findings are highlighted below.

6.2.2.1 *Key Findings Relating to WBA/CBME*

The focus group findings broadly supported those from the document analysis. In general, the participants noted that achieving a Level 4 rating was the basic requirement. They noted that this was problematic, and stifled ability to look beyond competence to excellence.

The focus groups foregrounded specific limitations of WBA/CBME in terms of practice, particularly relating to implementation. For example, tertiary and quaternary contradictions indicating that WBA/CBME conflicted with historical practice, academic requirements, and workplace activities were evident. A frequently referenced strength of WBA is that it is based on day-to-day, authentic workplace activities, so should be feasible and easily completed (e.g. Norcini et al., 2003; Frank et al., 2010; Holmboe, 2018). It was therefore interesting to note that this was not the case in this research. The ability to take time to discuss WBA in a busy clinical environment was raised by both interns and tutors as a core issue, and has been previously raised as a concern by CBME critics (e.g. Jones Jr et al., 2011; Lurie, 2012).

In addition, the focus groups highlighted significant variation in WBA practice between different training establishments. Variation in WBA/CBME has generally been considered problematic, and something that can be avoided through sufficient training and standardisation of scales (Green & Holmboe, 2010; Crossley et al., 2011; Ginsburg, 2011). The focus group findings showed that tutors had developed local variations in order to overcome challenges presented by the official WBA/CBME requirements. For example, some tutors reported seeking input from co-workers on the intern's performance; others had reconfigured the competencies and behaviours into other formats to match what happened in their workplace. While deviations from standard practice are often considered erroneous or problematic, using activity theory allowed these variations to be interpreted as problems in the system leading to development and learning (Engeström, 2001). Interestingly, the steps taken by tutors to include multiple views in the assessment, and to reorganise the competencies to suit the workplace activities reflect more recent developments in WBA such as the move towards multiple assessors (Swing et al., 2009; Holmboe et al., 2010) and EPAs (ten Cate et al., 2015a).

6.2.2.2 *Original Contribution to the Literature*

The activity theory-based focus group findings suggest that rather than trying to eliminate variation through training and standardisation it may be worthwhile to request that interns and tutors share examples of local initiatives to work around issues in WBA/CBME. Adopting this perspective, may help overcome challenges of WBA implementation that are otherwise hidden, and provide important context for challenges experienced. Therefore, this research contributes to WBA/CBME by calling for variations in practice to be framed as an opportunity for learning and development of new practice to support implementation and systematically collected

and shared. It also provides evidence that there are challenges associated with WBA/CBME implementation in practice, and CBME advocates should consider presenting it as being part of daily activities, as it may not represent experiences of practitioners and may lead to increased frustration.

6.2.3 User Testing

The document analysis and focus groups identified important contextual factors, and indicated that Compass was not considered particularly helpful or problematic by the interns or tutors. The user testing experiments were designed to focus more narrowly on the technology itself and the impact of the visualisation tool on how the interns and tutors reviewed the ratings independently before the review meeting. The key findings from this part of the research are discussed below.

6.2.3.1 *Key Findings Related to WBA/CBME*

When using Compass or the Visualisation Tool, no technical difficulties were experienced by interns or tutors. This was a positive finding, as ensuring technology is easily accessed and used in workplace settings is key (Holmboe et al., 2010; Bok et al., 2013). Although easily used, this research indicated that Compass technology inadvertently promoted fragmentation of the CCF into isolated behaviours, whereas this was largely avoided when the Visualisation Tool was used. Atomisation of competency frameworks reduces assessment validity, and should be avoided where possible (van der Vleuten & Schuwirth, 2005). This represented a strength of the visualisation tool. Another key difference was that when participants used the visualisation tool, they focused on the similarities and positive aspects of the ratings, rather than only the problematic differences. This indicated that it helped focus on a balanced discussion which should strengthen the WBA (Bindal et al, 2011). However,

the technology could only achieve so much. Through employing a think aloud protocol, this experiment also highlighted that while CBME is intended to remove the focus on training as being a time-based practice, interns and tutors tended to frequently reference stage in training when rating competence which is not in line with CBME/WBA principles (Gruppen et al., 2016; Ferguson et al., 2017; Frank et al., 2017). The influence of the underpinning CCF framework was also a key finding, as participants struggled to make sense of some behavioural descriptors even though they were able to use the technology without difficulty. The challenges posed by the CCF as a competency framework reflected the concerns of CBME critics who note the challenges of developing frameworks that genuinely supported learner development in a range of settings (Lurie et al., 2011; Lurie, 2012; Delany et al., 2016).

6.2.3.2 *Original Contribution to the Literature*

To my knowledge, this is the first research to qualitatively explore the role of technology in WBA practice, and therefore as a prompt for others to research how their technology design influences WBA practices. Findings suggest that those involved in introducing WBA/CBME should give due consideration to the design of technology used and its potential to impact practice beyond convenience/saving time. This experiment also provides evidence suggesting that while CBME facilitates time-variable progression based on ability rather than time, practitioners need to be supported to adopt this new way of thinking.

6.2.4 Practice Observations

The practice observations allowed the study of how the WBAs were conducted in practice with Compass (one observation) or the Visualisation tool (two observations). The key findings are discussed below.

6.2.4.1 *Key Findings Related to WBA/CBME*

Whether using Compass or the Visualisation Tool, the technology remained the core focus of the discussion during the practice reviews, guiding the discussion and providing a focal point for the interns and tutors. The role of technology is not well considered in the literature, and it is generally considered from an administrative perspective only (Holmboe et al., 2010, p.677) rather than recognising its wider role in directing discussion/structuring discussions which requires more research (Bok et al., 2013). As with the user experiments, using the visualisation tool enabled the intern and tutor to quickly identify similarities and differences, but the observations also indicated that this time saved was redirected towards providing more feedback that was less fragmented. This is a positive step, as the role of narrative feedback in WBA/CBME is increasingly recognised (Ginsburg et al., 2017) However, other issues not addressed by the technology were also present. Tutors again referred to competence in terms of stage of the year/time rather than the intern's demonstrated competence, and used themselves as reference points for the intern's competence. There was evidence of interns and tutors struggling to comprehend some of the behaviours, and of variance in interpretation of others. As discussed above, these issues reflect concerns of WBA/CBME critics (Lurie et al., 2011; Lurie, 2012; Delany et al., 2016).

6.2.4.2 *Original Contribution to Literature*

To my knowledge, this is the first study to conduct direct observations of WBA in order to study the introduction of technology on practice. Therefore, it contributes to the literature in a number of ways. Firstly, it provides empirical evidence that changing the manner in which data is presented using technology appears to impact how interns and tutors approached the review meeting (in line with the user

experiment findings). The approach leads to more efficient review of data, which leads to more time being spent on providing feedback, a positive finding (Ginsburg, 2017). Secondly, as with the user experiments, this provides empirical data that indicates there are wider issues unrelated to technology evident. Limitations with competency frameworks, challenges with moving away from historical conceptualisations of competence as time-based, and consistency in application of rating scales were evident. Inconsistent application of scales is a frequently cited limitation, and to my knowledge this is the first study that reveals that this happens consistently across both simulated and authentic settings. The practice observations also provided empirical evidence that tutors were actively deviating from practice with positive intention, e.g. discussing matters outside the CCF such as personal issues or professional identity development, often said to be overlooked in CBME (Jarvis-Selinger et al., 2012). Finally, direct observations provide a set of empirical data through which ideological arguments emerging in the more recent literature can be tested. This is an important step towards adding empirical research to the predominantly theoretical arguments currently evident, and has recently been called for in the literature (Holmboe, 2018; Krupat, 2018).

6.3 Addressing the Aims and Objectives of the Research

Having discussed each individual method employed in the research above, I now aim to draw together the various elements and address the overall aims and objectives. The overall aim of this research was *to explore how the introduction of a novel Visualisation Tool affects the workplace-based assessment practices of pharmacy interns and tutors in Ireland*. Three related study objectives were used to structure the development of the research designed to address this aim. The aims and objectives presented in this research were purposefully exploratory, as there is such limited

published research available about the specific area researched. Therefore, I deliberately avoided the use of multiple highly specific, pre-determined research questions. Instead, I conducted research designed to explore three related objectives before combining these findings to achieve the aim of the research. Adopting an exploratory approach throughout this research allowed me to consider the features of practice and the role of technology from the perspectives of the participants and not overestimate the importance of particular elements due to my own personal interests. In this case, while I was interested in technology, I used theoretical and methodological approaches that allowed me to position this research within the context of the participants' experiences. Taking this view was informed by what I had learned from designing Compass, i.e. the importance of considering the overall context as well as the specific functionality of the technology. In the following sections, the findings relating to each of the objectives are presented and briefly discussed.

6.3.1 Current Practice

The first objective of this research was *to explore current practices, strengths, and challenges in WBA in the NPIP, including the role of technology*. The ambition to address this objective was twofold. Firstly, I realised that if I aimed to study the impact of introducing new technology to practice it would be necessary to first understand existing practice in detail. Without doing this I risked drawing conclusions about potential impacts that were not grounded in reality. Secondly, the literature review had identified that CBME and WBA researchers had largely focused on studying particular aspects of WBA rather than considering how these aspects related to each other (Morcke et al., 2013). This tendency to isolate specific areas to research rather than consider practice as a whole was increasingly noted as a limitation of

WBA research, as findings may not reflect the complexity of practice. Initially when reviewing the literature, I was reminded of the following observation by Vygotsky (1987) which highlights the dangers of analysing processes based upon individual elements:

This mode of analysis can be compared with a chemical analysis of water in which water is decomposed into hydrogen and oxygen. The essential features of this form of analysis is that its products are of a different nature than the whole from which they are derived. The elements lack the characteristics inherent in the whole and they possess properties that it did not possess. When one approaches the problem of thinking and speech by decomposing it into its elements, one adopts the strategy of the man who resorts to the decomposition of water into hydrogen and oxygen in his search for a scientific explanation of the characteristics of water, its capacity to extinguish fire or its conformity to Archimedes law for example. This man will discover, to his chagrin, that hydrogen burns and oxygen sustains combustion. He will never succeed in explaining the characteristics of the whole by analysing the characteristics of its elements.

The findings from this aspect of the research indicated that from a practice perspective, the NPIP WBA involved multiple interrelated components (shown in Fig. 4.7). Technology (Compass) was identified as one of several tools used in this practice, but was not particularly foregrounded by participants. While not particularly emphasised by participants it was clear the technology played a role greater than the administrative one suggested in the majority of the literature. While the literature tended to isolate and assign particular important aspects to WBA such as rating scales, competency frameworks, and faculty development, this has to-date overlooked the important relationships between elements in complex WBA systems identified in this research (Holmboe, 2018). The thesis findings also show that in practice, many context-specific problems arose, leading participants to develop local innovations to overcome these issues, many of which were now well established within their workplace. For example, in one placement, the tutor had worked collaboratively with a group of pharmacists to restructure the competencies and behaviours in a manner

that reflected how they applied in their specific contexts. Others had developed ways of overcoming the limitations of the one-to-one tutor and intern relationship by including others in the process. In terms of technology, some interns and tutors had overcome difficulties with Compass by printing the competency framework and manually annotating their ratings prior to entering them on Compass. These innovations contribute towards variance in WBA practices in the NPIP. While it was evident that these were considered necessary and well-intentioned improvements by the tutors to overcome implementation challenges in particular contexts, from a CBME perspective, it is interesting to note that this would most likely be considered unwelcome variance, as one of the ‘strengths’ of CBME is perceived objectivity. It would be interesting to see how the findings relating to complexity and local innovations are reflected in WBA in other settings.

Establishing practice also allowed the conflicting perspectives on CBME and WBA to be explored using empirical data. The literature on these topics is dominated by perspective and opinion pieces, and thus practice is apparently supported by an ‘eminence-based’ rather than evidence-based approach (Boyd et al., 2018). Using the empirical data gathered, it was evident that for most of the issues identified in the literature, as with most things, the truth lies somewhere in the middle. For example, competency frameworks appeared to be neither as problematic as suggested by some authors, nor as useful as suggested by others. The same is true for all other tools discussed in this study. Instead, there were elements of strength and limitation evident for each. A more helpful approach could be to avoid looking narrowly at particular strengths/weaknesses of particular aspects of WBA in isolation, but to more accurately represent their use in practice as part of a wider group of tools and consider

their relationships, as most issues identified arose from tensions between specific tools.

The key findings of this chapter relating to the first objective of this thesis can be summarised as follows:

- WBA practice in the NPIP is complex and requires the complex interplay of multiple elements. Due to this complexity, problems arise. When they do, participants seek ways to overcome them locally, resulting in variance in practice.
- Rather than being ‘good’ or ‘bad’ CBME/WBA and related elements are associated with a number of strengths and weaknesses in practice and this varies depending on the context. Rather than focussing only on individual elements, more emphasis should be put on how they relate to, and work with each other.
- The role of technology is not particularly foregrounded by participants. Therefore, it is important not to overemphasise its role. Technology forms one of a set of tools that are used together, care should be taken about considering it in isolation.

6.3.2 How Technology is Used

The second objective of this study was *to explore how interns and tutors use Compass with(out) the visualisation tool as part of WBA*. This was addressed in Chapter 5, which focused specifically on the role of technology. The findings from Chapter 4 had indicated that Compass was used for three main steps; to input ratings, to review and compare intern and tutor ratings prior to the review meeting, and during the review meeting itself. As the Visualisation Tool would only be used in the second and third steps, this chapter focussed on exploring the use of both technologies during these steps. The aim was to establish how the interns and tutor actually used these tools,

rather than their attitudes towards them, and a key element was to explore any differences.

The key findings of this chapter relating to the second objective of this thesis can be summarised as follows:

- Using the visualisation tool assisted users to avoid the fragmented approach evident with Compass and did not only focus on individual behaviours in isolation. Users interpreted the graphs without difficulty and could identify and focus on discrepancies more readily. Using the visualisation tool was more efficient, allowing more time in the review meetings for more meaningful discussion.
- There were very few technical issues reported by users of both tools, with participants interacting with the tool automatically, rather than having to deliberately consider its functionality.
- The close relationship between the technology and other elements is an important consideration. Specific issues were identified during the study of technology that related to WBA.

6.3.3 The Role of Theory

The final objective of this study was *to explore how using theory contributes to the study of WBA practice*. There is a purposeful focus on theory in this thesis due to a noted gap in the literature relating to theory-informed studies in CBME and WBA, and in health professions education more widely. In Chapter 3, the call from (Holmboe, 2018, p.352}, to “use methodological approaches that incorporate the effects of complexity” was noted. In most cases, a PhD is either considered to be theoretical or empirical, a distinction I found unhelpful when designing this study.

Instead, I found it more useful to conceptualise this as a spectrum from theoretical to empirical, with this thesis sitting at a point indicating that it is one third theoretical, and two thirds empirical. Framing my study like this, with a specific objective relating to theory ensured that I could dedicate time and words to examine the steps needed to design a practice study using a theoretical framework in a robust manner and present my approach in detail that will likely be useful to others. Using specific guidelines as a framework to ensure the theoretical framework identified was applied systematically was particularly useful. It also meant that the study is internally consistent and that the methods, analysis, and conclusions align from ontological and epistemological perspectives. In the research, activity theory was identified as a suitable framework based primarily on a consideration of the study aim and a particular interest in studying practice. While the theoretical benefits and challenges of using activity theory have been discussed in Chapter 3, a number were particularly evident during this research. Activity theory was helpful in determining the basis for selection of research approaches, for developing analytical frameworks, identifying practices, embracing rather than avoiding complexity, managing large amounts of data, and understanding relationships. It also presented challenges. As it does not prescribe methods, they must be identified and applied according to the research context making study design more complex than with other more defined methodologies (e.g. phenomenography and semi-structured interviews), the data collection methods generate large amounts of data, and the underpinning theory is conceptually challenging.

The key findings of this chapter relating to the third objective of this thesis can be summarised as follows:

- It is possible to identify practice theories to the study of WBA that will embrace complexity and use theory to design high-quality research studies.
- Activity theory is particularly useful for studies that wish to study artefacts as part of practice, and allows the examination of practice from the perspective of users.
- Using activity theory to study WBA practice has several benefits, but applying the theory can be methodologically challenging.

6.3.4 Summary

The aim of this research was *to explore how the introduction of a novel Visualisation Tool affects the workplace-based assessment practices of pharmacy interns and tutors in Ireland*. In this thesis, I explained how I designed a study that sought to explore WBA from a theory-informed practice perspective. Using existing practice as a starting point was helpful to put the role of technology in perspective. Participants in the various elements of the research did not seem particularly concerned with technology to a great degree, and it quickly became evident that technology was only one of many elements that worked in concert to facilitate WBA. Commencing this study with a study of existing practice also highlighted its inherent complexity, that several issues were apparent, and the Visualisation Tool would only address a small subset of these issues.

Therefore the impact of the visualisation tool can be considered as: allowing interns and tutors to reconfigure numerical ratings into interactive radar graphs can help overcome some specific issues in WBA practice relating to the requirement to use the CCF and CoDEG scale in complete multiple WBAs by presenting data in a manner that helps avoid reductionism, improve interpretation, and increase time available for discussion without technical issue, as part of a wider group of tools.

6.4 Contributions of this Research to Knowledge

As CBME and WBA have become more widely adopted, the numbers of publications have increased significantly, with extensive evidence generated relating to specific aspects of both, with a predominant focus on medicine. Findings from this thesis will contribute to this existing literature as follows.

This study is, to my knowledge, one of the first to address calls to research CBME/WBA from a holistic practice perspective that avoids artificially fragmenting CBME/WBA. Therefore, it addresses a specific gap in the CBME/WBA literature.

This study therefore should serve as one response to the repeated calls for the empirical study of WBA. It will therefore contribute to the CBME/WBA literature by adding some evidence upon which the claims about CBME/WBA can be evaluated, and form part of the research used to address the worrying development of a discourse of infallibility recently described by Boyd et al., (2018).

Another gap in the literature regularly highlighted in the CBME/WBA, medical, and health professions literature is the appropriate use of theory in research (Morcke et al., 2013; Stewart, 2016). In this study, I consciously identified, applied, and evaluated a practice theory (activity theory), with specific reference to a set of quality guidelines. While the use of theory in higher education appears to be somewhat taken for granted, this is not the case for medical and health professions education. More recently, an increased use of theory is evident, although it is frequently applied inconsistently, evident in several of the studies reviewed in this thesis (Regehr, 2012; Jarvis-Selinger, 2012). Insufficient detail on theory-method relations in the medical education literature is sometimes attributed to limited word restrictions, however it is welcome to see that a number of publications specifically relating to theory in health professions education are emerging. It is hoped that the clear description, application,

and evaluation of activity theory in this thesis can similarly contribute (Watling, 2012).

The findings of this thesis are also important to the pharmacy education community. As explained in Chapter 2, pharmacy education literature relies heavily on the wider health professions literature for direction. Publications relating to CBME/WBA in pharmacy have only more recently begun to feature in publications relating to pharmacy, and they are few in number. Therefore this research which was undertaken in a pharmacy context will also contribute towards this literature gap.

6.5 Implications for CBME/WBA Practice

The findings in this study also have practical relevance. The research is particularly timely as another change in pharmacy education is imminent. The '4+1' model of education is in the process of being replaced with an integrated system where two workplace-based placements are completed in the fourth and fifth years of study. This means that WBA will be included in two years of education, and there is an opportunity to reflect on what improvements can be made. The findings of this research have been shared with colleagues to help inform the design of WBA for the new programme structure and for evaluation of the role of the CCF and review of the rating scale.

Both Compass and the Visualisation Tool were designed as open-source. This was a key aim of mine at the outset, to ensure that others could use this technology (once they have access to Moodle – a widely used VLE). Compass will accommodate any competency framework, rating scale, or number of WBAs and is not discipline specific. It is currently being used in other universities in Ireland, and it is anticipated

that it may become a core feature of Moodle in the future. Therefore, the findings in this thesis have the potential to be relevant to others using these features.

6.6 Study Limitations

As with all research, while every effort was made to design and execute a robust study, like all research it has some limitations. These are listed below, and the steps taken to minimise their impact on this research is explained.

The first potential limitation relates to the fact that as this study was conducted entirely within the context of the NPIP, the scope is limited to postgraduate pharmacy education in Ireland. This specific focus may limit the relevance of the findings to studies in other fields or jurisdictions. Where possible, the findings have been discussed with reference to the international literature so that the interpretation is made within a broader context.

The second potential limitation is the relatively low number of participants in certain parts of the research. As this is a qualitative study, the number of participants is not critically important but it is still worth consideration for certain parts. For example, one review meeting was analysed using Compass and two with the Visualisation Tool were conducted in this study, which increases the possibility that the findings may not be representative of all interns and tutors. However, these findings were not used alone to draw conclusions as this research employed multiple methods and triangulation of findings was possible.

The third potential limitation relates to the fact that I conducted all the coding and analysis completed during this thesis. This increases the possibility that my own bias may have influenced the findings. As this work was done for the purposes of a PhD it

was not possible to use a second coder, but in order to demonstrate transparency in coding, detailed illustrative quotes/images are provided throughout the thesis.

The fourth potential limitation is the lack of prior research that researched CBME/WBA practice. This meant that there was no 'template' upon which to base this study. Therefore, an exploratory study design was used, and the design was closely based on the theoretical framework used to increase its strength.

6.7 Further Research

Initial findings arising from this research have been discussed with colleagues at national and international conferences and have generated discussion about how the work in this thesis can be built upon after publication of initial findings.

The Visualisation Tool is an information visualisation tool intended to improve the participants' experiences of WBA. In this thesis, this was considered from an activity theory perspective as a tool. I intend to conduct a secondary analysis of the data relating to the user experiments and practice observations using Peircean semiotics to establish how participants made meaning from the data presented on Compass when compared with the Visualisation to explore the visual aspect of Compass in more detail.

It is likely that over the upcoming years, the checklist-based approach to WBA described in this thesis will be replaced/complemented with more evolved forms of WBA such as EPAs. Due to the flexibility in the architecture of Compass and the Visualisation Tool, it will be possible to conduct a similar study relating to WBA using different assessment tools. I hope to replicate this study using novel assessment forms to explore the impact of the assessment type on practice, and how the tool is used.

6.8 Concluding Remarks

This research, which represents a first-of-its kind study of WBA in pharmacy highlights the potential of using visualisation-based approaches in addressing specific issues relating to challenges in WBA. However, it is important to note that as the participant quote at the beginning of this chapter identifies, technology should not be considered alone, but as part of a complex system where multiple tools and multiple problems coincide. It appears that interns and tutors are striving to work within these imperfect systems and developing local innovations to overcome barriers.

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Appendix A

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Participant Information Sheet: Focus Groups

Workplace-Based Competence Assessment of Pharmacy Interns

Current, potential and Emerging Practices: A Case Study of a Novel Visualisation Tool.

What is the purpose of the study?

The study aims to research competence assessment practices by interns and tutors as part of the National Pharmacy Internship Programme. While guidelines are provided to tutors and interns at training and induction days respectively, I wish to study the actual practices of tutors and interns, and how the competence assessment process happens in real life settings as part of my doctoral research with the Department of Educational Research at the University of Lancaster. This study has three parts overall and will examine how new visualisation software designed to support appraisals might impact on existing practices and experiences. These focus groups are an element of Part 1, and the aim of Part 1 is to gather information from a range of tutors and interns who have experiences of completing competence appraisals as part of the National Pharmacy Internship Programme about current practices.

Who is conducting the study?

The study is being undertaken by:

- **Michelle Flood**, School of Pharmacy, Royal College of Surgeons in Ireland, Dublin, Ireland.

Full contact details are included at the end of this document.

Why have I been asked to take part?

You have been asked to take part because you have been identified as somebody who has experience as a tutor or an intern of the competence assessment process. I would like to gather information from you and other people like you to help me understand more about the experiences of tutors and interns.

What will happen during the study?

If you decide you are happy to take part in the study, you will be asked to take part in a 'focus group'. The group will be asked a number of questions about your experiences of competence assessment. The group will be made up of tutors only, interns only, or a mix of tutors and interns. Focus group research is based on the principle that interactions between participants as part of a group are helpful for researchers. Individuals' contributions and understandings are enriched by the group dynamic, allowing for sharing and comparing of experience. It will take approximately 90 minutes to complete.

The group discussion will be facilitated by me, and I will ask questions to the group members who will sit around a table together. With your permission, the session will be recorded as audio and video

files and subsequently transcribed into a written document so that I can analyse the information from the focus group along with the information collected from other participants. The purpose of the video is as a back up source of information if it is difficult to ascertain who is talking from the audio file alone. Otherwise it will not be used for analysis. The data collected (audio and video) will not be stored with your name on it. I will assign you a number, e.g. 'Participant 1', and this will be used to name all files to ensure the data is stored anonymously. You will have the opportunity to review and edit the document before it is used for analysis, to make sure you are happy that it represents what you said.

After I have collected and analysed the information collected from all participants I intend to publish the results of the overall study as part of a PhD thesis and at academic conferences or in academic journals.

How do I give my consent to take part?

Firstly, you are asked to read this sheet fully and make sure you understand this part of the study. If you have any questions, you can contact me, the lead researcher, Michelle Flood at michelleflood@rcsi.ie or on **+353 (1) 4022385**. You will be asked to complete the consent form (attached) before taking part in the research study. Please read and ensure you are happy to complete the consent form, and ask any questions you have as above.

If you have no questions, and are happy to take part, please reply via email to michelleflood@rcsi.ie and a suitable time for all participants to attend the focus group will be arranged. The focus group will be held in the private conference room in the School of Pharmacy offices in the Royal College of Surgeons in Ireland, Dublin 2.

What if I do not want to take part, or if I change my mind?

Participation in the study is entirely voluntary. If you do not wish to take part then that is not a problem. You do not need to take any action, but I would appreciate it if you would notify me by return email to michelleflood@rcsi.ie.

You might wish to change your mind after initially agreeing to take part, and withdraw from the study. If you wish to stop part way through the focus group, that is no problem. You can notify me and you can stop participation and leave the group session, and your data will not be used in the study.

You might decide after the interview that you are no longer happy for your information to be used. If you decide to withdraw after the study, and contact me within **two weeks** of the interview, your data will be destroyed and not used. After this point, the data will remain in the study.

Refusal to take part, changing your mind or withdrawing from the study will not involve a penalty of any kind and will have no bearing on your relationship with the researcher or any institution associated with the study.

How will my information be stored and who will have access to it?

All information collected from you will be encrypted and stored in a dedicated, password-protected computer folder and will only be accessible to the researcher on the study. Data (whether video or audio or written) will not be stored with any names/identifiers, and the transcripts will not be accessible to anyone other than the researcher. The information you give during the focus group will be typed out then the audio and video files will be destroyed. If, for any reason, you would like a

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copy of the information you provided after the study is completed then please email michelleflood@rcsi.ie or call **+353 (1) 4022385**.

Any publications arising from this project will not identify you or your institution. All information will be encrypted and stored in the secure computer folder, in line with the requirements of the Data Protection Act and Lancaster University Ethics Committee requirements. Data is kept securely for a minimum of 10 years and is then securely destroyed in line with Lancaster University requirements for all research data.

What are the potential risks or benefits involved for me in the study?

There are no risks identified for participants who participate in this study. No confidential or sensitive information will be collected by the researcher. All information that could identify you will be removed before the data is analysed. It is not possible to offer any financial incentive or any expenses for participants as this project does not have any external source of funding, but refreshments will be provided to all participants at the focus group sessions.

Participating in this study will help improve the understanding of the role competence assessment as part of the roles of interns and tutors on the National Pharmacy Internship Programme. This will help me understand how the competence assessment processes for interns and tutors can be improved.

Who has reviewed this project?

Ethical approval for this study has been obtained from Lancaster University Research Ethics Committee.

Contact details for the researcher

Michelle Flood (Lead Researcher)

School of Pharmacy,
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Who do I contact if I am concerned about some aspect of the study or if I would like to make a complaint?

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Appendix B

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Participant Information Sheet: User Evaluations

Workplace-Based Competence Assessment of Pharmacy Interns

Current, potential and Emerging Practices: A Case Study of a Novel Visualisation Tool.

What is the purpose of the study?

The study aims to research competence assessment practices by interns and tutors as part of the National Pharmacy Internship Programme. While guidelines are provided to tutors and interns at training and induction days respectively, I wish to study the actual practices of tutors and interns, and how the competence assessment process happens in real life settings.

This study has three parts overall and will examine how new visualisation software designed to support appraisals might impact on existing practices and experiences. These user experiments are an element of Part 2 of the study, and the aim of Part 2 is to gather information from a range of tutors and interns who have experiences of completing competence appraisals.

I want to study current practices using the compass software that you will have used before, while also asking you to use new software to complete appraisal tasks. Through closely studying the use of existing and new software I will better understand its role in the process for tutors and interns.

Who is conducting the study?

The study is being undertaken by:

- **Michelle Flood**, School of Pharmacy, Royal College of Surgeons in Ireland, Dublin, Ireland.

Full contact details are included at the end of this document.

Why have I been asked to take part?

You have been asked to take part because you have been identified as somebody who has experience as a tutor or an intern of the existing competence assessment process and using compass for appraisals. I would like to gather information from you and other people like you to help me understand more about the experiences of tutors and interns.

What will happen during the study?

If you decide you are happy to take part in the study, you will be asked to take part in a 'user evaluation'. This will take approximately 1 hour in total and will take place in the School of Pharmacy offices in RCSI.

You will be set up at a computer with the compass software open and asked to review a set of appraisal data as you normally would, in your role as an intern or tutor. You will be asked to 'think aloud' while completing the review. This means that you will be asked to literally think out loud,

voicing your thoughts as you complete the task (you will be introduced to the think aloud method using brief 'warm-up' tasks with the researcher which will take approximately five minutes).

You will be asked to review 2-3 domains using the compass software that you have used previously as a tutor/intern, which will take approximately 20 minutes.

You will then be shown how to use the new feature of the software (this will take about 5 minutes), and you will be asked to review another 2-3 domains using the new feature (approximately 20 minutes).

It is not anticipated that the use of this new feature will be technically difficult to use, and no special skills are needed in order to take part. There are no 'right' or 'wrong' approaches, I will just be looking at how the software might be used by different tutors/interns. After this, I may ask you a few brief questions if I need to clarify anything, e.g. 'What did you mean when you said x or y?'

This process will be recorded using a video recorder as I want to capture the computer screen as well as what you are saying. The data collected will not be stored with your name on it. I will assign a participant number to you, e.g. 'Participant 2' and this will be used to name all the files to ensure the data is stored anonymously. All information will be treated confidentially. You will have the opportunity to review and edit the document before it is used for analysis, to make sure you are happy with it and that it represents what you said.

After I have collected and analysed the information collected from all participants I intend to publish the results of the overall study as part of a PhD thesis and at academic conferences or in academic journals.

How do I give my consent to take part?

Firstly, you are asked to read this sheet fully and make sure you understand all parts of the study. If you have any questions, you can contact the researcher, Michelle Flood at michelleflood@rcsi.ie or on **+353 (1) 4022385**. You will be asked to complete the consent form (attached) before taking part in the research study. Please read and ensure you are happy to complete the consent form, and ask any questions you have as above.

If you have no questions, and are happy to take part, please reply via email to michelleflood@rcsi.ie and a suitable time for all participants to attend the focus group will be arranged. The focus group will be held in the private conference room in the School of Pharmacy offices in the Royal College of Surgeons in Ireland, Dublin 2.

What if I do not want to take part, or if I change my mind?

Participation in the study is entirely voluntary. If you do not wish to take part then that is not a problem. You do not need to take any action, but I would appreciate it if you would notify me by return email to michelleflood@rcsi.ie.

You might wish to change your mind after initially agreeing to take part, and withdraw from the study. If you wish to stop part way through the focus group, that is no problem. You can notify the researcher and you can stop participation and leave the session, and your data will not be used in the study.

You might decide after the interview that you are no longer happy for your information to be used. If you decide to withdraw after the study, and contact me within **two weeks** of the interview, your data will be destroyed and not used. After this point, the data will remain in the study.

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Refusal to take part, changing your mind or withdrawing from the study will not involve a penalty of any kind and will have no bearing on your relationship with the researcher or any institution associated with the study.

How will my information be stored and who will have access to it?

All information collected from you will be encrypted and stored in a dedicated, password-protected computer folder and will only be accessible to the researcher on the study. Data (whether video or audio or typed) will not be stored with any names/identifiers, and the transcripts will not be accessible to anyone other than the researcher. If, for any reason, you would like a copy of the information you provided after the study is completed then please email michelleflood@rcsi.ie or call **+353 (1) 4022385**.

Any publications arising from this project will not identify you or your institution. All information will be stored in the secure computer folder, in line with the requirements of the Data Protection Act and Lancaster University Ethics Committee requirements. Data is kept securely for a minimum of 10 years and is then securely destroyed in line with Lancaster University requirements for all research data.

What are the potential risks or benefits involved for me in the study?

There are no risks identified for participants who participate in this study. No confidential or sensitive information will be collected by the researcher. All information that could identify you will be removed before the data is analysed. It is not possible to offer any financial incentive or any expenses for participants as this project does not have any external source of funding, but refreshments will be provided to all participants at the evaluation sessions.

Participating in this study will help improve the understanding of the role competence assessment as part of the roles of interns and tutors on the National Pharmacy Internship Programme This will help me understand how the competence assessment processes for interns and tutors can be improved.

Who has reviewed this project?

Ethical approval for this study has been obtained from Lancaster University Research Ethics Committee.

Contact details for the researcher

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Appendix C

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Participant Information Sheet: Practice Observations

Workplace-Based Competence Assessment of Pharmacy Interns

Current, potential and Emerging Practices: A Case Study of a Novel Visualisation Tool.

What is the purpose of the study?

The study aims to research competence assessment practices by interns and tutors as part of the National Pharmacy Internship Programme. While guidelines are provided to tutors and interns at training and induction days respectively, I wish to study the actual practices of tutors and interns, and how the competence assessment process happens in real life settings as part of my doctoral research with the Department of Educational Research at the University of Lancaster. This study has three parts overall and will examine how new visualisation software designed to support appraisals might impact on existing practices and experiences. These practice observations are an element of Part 3, and the aim of Part 3 is to gather information from a range of tutors and interns who are completing competence assessments as part of the National Pharmacy Internship Programme. I wish to observe competence reviews in 'real time', so that I can better understand how the assessments take place in the practice setting.

Who is conducting the study?

The study is being undertaken by:

- **Michelle Flood**, School of Pharmacy, Royal College of Surgeons in Ireland, Dublin, Ireland.

Full contact details are included at the end of this document.

Why have I been asked to take part?

You have been asked to take part because you have been identified as somebody who is a tutor or an intern and will be completing the competence assessment process during the study period. I would like to gather information from you and other tutors/interns like you to help me understand more about the experiences of tutors and interns completing competence appraisals.

What will happen during the study?

If you decide you are happy to take part in the study and your tutor/intern also agrees I will arrange to visit the training establishment at a time that suits you both to complete the competence assessment. I will ask you to direct me to where the appraisal will take place in order to set up the simple recording equipment I will need to record the computer screen as well as the conversation that takes place between you and your tutor/intern as part of the competence appraisal.

I hope to observe your discussion in a completely unobtrusive manner, so will set up the equipment so as not to disturb your usual processes and I will sit out of your way in a place that is convenient to you. I will then ask you to proceed with the competence assessment/review as you would usually.

I am not interested in the ratings assigned or assessing in any way how the competence assessment/review was conducted, I am simply interested in observing how they happen in practice.

Once you are finished I may ask some questions to clarify particular points, for example 'What did you mean when you said x or y?' I will not discuss the assessment/review itself after the observation, but should either the tutor or intern or both have questions arising from the review, the Practice Liaison Pharmacist will be available to discuss any queries by email or telephone or can visit your training establishment at a time convenient to you as part of his standard role.

With your permission, the session will be recorded as audio and video files and subsequently transcribed into a written document so that I can analyse the information from the competence assessment along with the information collected from other participants. The purpose of the video is to record the computer screen so I can see if/how you use compass and/or the new features as part of the competence assessment review.

The data collected (audio and video) will not be stored with your name on it. I will assign a number, e.g. 'Participant 3', and this will be used to name all files to ensure the data is stored anonymously. All data collected will be treated confidentially.

After I have collected and analysed the information collected from all participants I intend to publish the results of the overall study as part of a PhD thesis and at academic conferences or in academic journals.

How do I give my consent to take part?

Firstly, you are asked to read this sheet fully and make sure you understand all parts of the study. If you have any questions, you can contact the lead researcher, Michelle Flood at michelleflood@rcsi.ie or on +353 (1) 4022385. You will be asked to complete the consent form (attached) before taking part in the research study. Please read and ensure you are happy to complete the consent form, and ask any questions you have as above.

For this study, both tutor and intern will be required to give their consent for participation in the study in order to be eligible to participate. If your intern/tutor has agreed to participate but you do not wish to, you are under no obligation to agree.

If you have no questions, and are happy to take part, please reply via email to michelleflood@rcsi.ie and a suitable time will be arranged for me to attend your training establishment.

What if I do not want to take part, or if I change my mind?

Participation in the study is entirely voluntary. If you do not wish to take part then that is not a problem. You do not need to take any action, but I would appreciate it if you would notify me by return email to michelleflood@rcsi.ie.

You might wish to change your mind after initially agreeing to take part, and withdraw from the study. If you wish to stop part way through the observation, that is no problem. You can notify the researcher and you can stop participation and your data will not be used in the study.

You might decide after the observation that you are no longer happy for your information to be used. If you decide to withdraw after the study, and contact me within **two weeks** of the observation, your data will be destroyed and not used. After this point, the data will remain in the study.

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Refusal to take part, changing your mind or withdrawing from the study will not involve a penalty of any kind and will have no bearing on your relationship with the researcher or any institution associated with the study.

How will my information be stored and who will have access to it?

All information collected from you will be encrypted and stored in a dedicated, password-protected computer folder and will only be accessible to the researcher on the study. Data (whether video or audio or written) will not be stored with any names/identifiers, and the transcripts will not be accessible to anyone other than the researcher. If, for any reason, you would like a copy of the information you provided after the study is completed then please email michelleflood@rcsi.ie or call **+353 (1) 4022385**.

Any publications arising from this project will not identify you or your institution. All information will be encrypted and stored in the secure computer folder, in line with the requirements of the Data Protection Act and Lancaster University Ethics Committee requirements. Data is kept securely for a minimum of 10 years and is then securely destroyed in line with Lancaster University requirements for all research data.

What are the potential risks or benefits involved for me in the study?

There are no risks identified for participants who participate in this study. No confidential or sensitive information will be collected by the researcher. All information that could identify you will be removed before the data is analysed. It is not possible to offer any financial incentive or any expenses for participants as this project does not have any external source of funding.

Participating in this study will help improve the understanding of the role competence assessment as part of the roles of interns and tutors on the National Pharmacy Internship Programme This will help me understand how the competence assessment processes for interns and tutors can be improved.

Who has reviewed this project?

Ethical approval for this study has been obtained from Lancaster University Research Ethics Committee.

Contact details for the researcher

Michelle Flood (Lead Researcher)

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Contact details for the supervisor

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