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Continuing professional development (CPD) for pharmacists

Implications for professional practice

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Continuing Professional Development (CPD) for pharmacists: implications for professional practice

by

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ABSTRACT

This study considers the different Continuing Professional Development (CPD) activities undertaken by pharmacists and the implications this had for their professional practice. CPD is now mandatory for all UK healthcare professionals, including pharmacists. Pharmacists are required to undertake self-directed, unstructured learning, and can choose what they learn and how they learn it. However, some authors have recommended using a more structured approach for CPD. The purpose of CPD is to improve professional practice, although there is little evidence in the literature to demonstrate this. In this study, improved professional practice for pharmacists was taken to be engagement in extended patient care activities, as this is what is recommended in current healthcare policies in Northern Ireland.

A postpostivitist methodological approach was used in this study. Quantitative data was collected using an online questionnaire which was emailed to all qualified pharmacists in Northern Ireland. A postpositive approach recognises that pharmacists' responses were subjective and there was not an absolute truth that could be uncovered. Two multiple response sets were created: one for responses regarding CPD activities, and the other for responses relating to professional practices, and this enabled a holistic view of both to be gained. A mathematical method known as geometric coding was then used to convert the multiple response data into categorical variables that were amenable to confirmatory statistical analysis. This allowed the relationship between all the CPD activities that a pharmacist had undertaken and all the professional practices they engaged in to be analysed statistically.

This study found that the professional activities that pharmacists engaged in were influenced by the CPD activities they had undertaken. Unstructured learning was taken to be the baseline educational approach, as this is the minimum requirement stipulated by the pharmacy regulators. Pharmacists who undertook solely unstructured learning had the highest incidence of engagement in semi-professional activities that can be performed by any member of the pharmacy team. Almost a third of these pharmacists engaged in some extended patient care activities. Adopting a cognitive approach to semi-structured or structured learning did not confer any benefits over unstructured learning in this study with regard to extended patient care practice. Conversely, incorporating a constructivist component, whereby learners actively engage in professional practices in the workplace, led to improved participation in extended patient care activities, and was thus considered to enhance pharmacy practice. It was concluded that active engagement in structured professional practices improved the application of learning in the workplace, whereas separating theory from practice did not. However, in this study, some pharmacists who had undertaken learning with a constructivist educational approach were found not to be applying their learning in practice. The reasons for this could possibly have included a lack of opportunity and support in the workplace. Pharmacists' attitudes about pharmacy practice were also found to have an impact on the professional activities they engaged in. Having an 'Improve skill mix' view of pharmacy practice increased the likelihood of doing some extended practice, whilst the likelihood was reduced by having a 'Maintain current roles' view. This may suggest that some pharmacists were electing not to engage in extended practices in the workplace. Further study is recommended to explore more fully the reasons why some pharmacists were not applying their learning in practice. This could help to identify and potentially address barriers to implementing extended patient care practice in the future.

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CHAPTER 1: INTRODUCTION

1.1 Rationale

Pharmacy professional practice in the 21st Century must evolve towards extended patient care activities in order to meet the current and future needs of patients (Compton, 2011; Donaldson *et al*, 2014). However, previous studies have indicated that many pharmacists are still firmly entrenched in traditional 20th Century dispensing roles (Bell *et al*, 1999; McCann *et al*, 2010; Davies *et al,* 2014). These traditional roles can be performed by any member of the pharmacy team (pharmacy technicians and dispensing/pharmacy assistants in addition to pharmacists), and have been described as semi-professional roles in these previous studies.

All UK healthcare professionals, including pharmacists, must now undertake Continuing Professional Development (CPD). The stated purpose of CPD in UK healthcare professions' CPD policies is to improve professional practice, and this is then assumed to improve patient outcomes (Cole, 2000; Cleary *et al*, 2011; Donyai *et al*, 2011; Power *et al*, 2011). In this study, improved professional practice for pharmacists was taken to be engagement in extended patient care activities. The minimum CPD requirement for pharmacists in the UK is to undertake self-directed unstructured learning, and this was taken to be the baseline educational approach. Pharmacists can choose what they learn and how they learn it, which fits with the view that a flexible educational approach is the most appropriate for professional learning (Watkins & Marsick, 1992; Chivers, 2010). However, some have challenged this view, and have recommended a more structured approach to professional learning (Cross, 1981; Norman, 1999). Indeed, many pharmacists do choose to undertake more structured forms of learning which are over and above the baseline requirement for CPD stipulated by the pharmacy regulators. In addition, it has been suggested that CPD in the 21st Century should be located in the practices that professionals engage in to ensure that learning is applied in the workplace (Boud & Hager, 2012). Nevertheless, there is little evidence in the literature to demonstrate that CPD has a positive effect on professionals' practice, possibly because both CPD and professional practice are complex and multi-factorial and are thus difficult to measure (Mathers *et al*, 2012; Neimeyer *et al*, 2012). Despite this lack of evidence, however, there are increasing pressures across the professions to ensure that the educational approaches

used for CPD will improve practice (Webster-Wright, 2009; Carraccio *et al*, 2016). For this reason, a comprehensive tool was sought in this study to assess the different CPD activities that pharmacists undertook and the implications this had for the various professional practices they engaged in, including whether they undertook any extended practice. This study attempts to contribute new evidence to the field of professional development that could be used to inform theory, policy and practice relating to the educational approaches for pharmacists' CPD.

1.2 Research aim and questions

The main aim of the study was to investigate the CPD activities that pharmacists engaged in and the implications this had for their professional practice.

The main research questions were:

1. Are pharmacists' professional practices influenced by the CPD activities they engage in?
2. Do pharmacists' attitudes towards CPD, pharmacy practice and their working environment impact on the CPD activities and professional practices that they engage in?
3. What implications do these findings have for the educational approaches for pharmacists' CPD?

1.3 Outline of the study

A postpostivitist methodological approach was used in this study. This approach recognises that that there is not an absolute truth that can be uncovered (Costley *et al*, 2010; Hartas, 2010; Hammersley, 2012), and that pharmacists' responses would be their interpretation of reality and not reality itself (Mercer, 2007; Cohen *et al*, 2011). Quantitative data was collected using an online questionnaire which was emailed to all qualified pharmacists in Northern Ireland on 22 May 2015 (n = 2201). After two follow-ups there were 419 respondents, giving a response rate of 19%.

Data analysis entailed creating two "multiple response sets" to gain a holistic view of CPD and pharmacy practice (Acton *et al*, 2009, p. 161). "Geometric coding" was then used to convert the multiple response data into categorical variables that were

amenable to confirmatory statistical analysis (Acton *et al*, 2009, p. 177). Geometric coding is a mathematical method (Stichtenoth, 1990) which has been used in the healthcare context to assess the impact of different interventions on the management of complex patients with diabetes (Rascón-Pacheco *et al*, 2010). It can be employed in social science studies (Acton *et al*, 2009) although it does not appear to have been used in the social sciences context. The use of geometric coding in this study enabled the relationship between all the CPD activities that a pharmacist had undertaken and all the professional practices they engaged in, including extended patient care activities, to be analysed statistically. The use of this mathematical method in the field of professional development contributed to the distinctiveness of this study.

1.4 Structure of the dissertation

This chapter offers a brief introduction to the study as well as presenting the rationale, the questions it attempted to answer and an outline of how data was collected and analysed.

Chapter 2 considers the context in which the study was undertaken. It starts by looking at pharmacy professional practice, and how this has evolved to meet the current and future needs of patients. It then looks at Continuing Professional Development (CPD), which is now mandatory for all pharmacists in the UK, including those in Northern Ireland. The link between CPD and professional practice is then explored.

To try to gain a deeper understanding of CPD, the contribution of learning theories to the different educational approaches that are used for pharmacists' CPD are considered in chapter 3. The chapter starts by exploring the learning theories underpinning self-directed learning and informal (unstructured) on-the-job learning. It then goes on to explore the learning theories underpinning the more structured forms of learning used for pharmacists' CPD; that is traditional continuing education (CE) courses and workshops, and structured work-based learning.

Chapter 4 defends the research methods employed to collect the data and the approaches used. It starts with an outline of the research aim and questions and gives a summary of the research approach. It details the methods used, and includes the

rationale for the construction of the questionnaire. It concludes with a discussion of the ethical considerations associated with the study.

Chapter 5 presents the findings of the study. The first section of the chapter focuses on whether pharmacists' professional practices were influenced by the CPD activities they engaged in. It looks firstly at the professional practices that pharmacists engaged in, and then at the different CPD activities they had undertaken, before considering the influence that the latter had on the former. The second section of the chapter looks at the impact that pharmacists' attitudes towards CPD, pharmacy practice and their working environment had on the CPD activities and professional practices they engaged in. The chapter finishes with a summary of the factors that were found to influence professional practice in this study.

The implications of the findings of the study for the educational approaches for pharmacists' CPD are discussed in chapter 6. This is done by considering whether any of the more structured educational approaches used for CPD were found to enhance professional practice over and above the baseline findings for unstructured learning, where enhanced professional practice was taken to be improved engagement in extended patient care activities.

Chapter 7 draws some conclusions from the main findings of this study. The conclusions relating to the three research questions are summarised initially, and the implications for theory, policy and practice and then discussed further. This is followed by an outline of the limitations of the study and some suggestions for further research. The chapter finishes by discussing the distinctiveness and contributions of the study.

CHAPTER 2: THE CONTEXT: PHARMACY PROFESSIONAL PRACTICE AND CONTINUING PROFESSIONAL DEVELOPMENT (CPD)

2.1 Introduction

This chapter considers the context in which the study was undertaken. It starts by looking at pharmacy professional practice, and how this has evolved to meet the current and future needs of patients. It then looks at Continuing Professional Development (CPD), which is now mandatory for all pharmacists in the UK, including those in Northern Ireland. Finally, the link between CPD and professional practice is explored.

2.2 Pharmacy professional practice

Pharmacy professional practice has undergone radical changes over the last century. During the first half of the twentieth century, the main role of the pharmacist was to prepare medicines, which they would then dispense or sell to patients and customers. By the 1960s, however, the preparation of medicines in the Western world had largely been taken over by the pharmaceutical industry, and this "relegated the pharmacist to the role of dispenser of prefabricated drug products" (Hepler & Strand, 1990, p. 534). This rationalisation and automation of routine work processes was commonplace in the twentieth century, and any remaining professional jobs grew in complexity as a result (Hage & Powers, 1992). For pharmacists, this increase in job complexity came about with the introduction of roles involving rationalising the use of medicines (Baker *et al*, 1988); a practice which came to be known as clinical pharmacy (Calvert, 1999). Clinical pharmacy spread throughout many Western countries in the 1970s and 1980s, with clinical pharmacists developing and implementing policies and procedures to promote the rational and appropriate use of medicines (American College of Clinical Pharmacy, 2008; Hartvig, 2009). Towards the end of the twentieth century, however, clinical pharmacy began to receive criticism for focusing on the medicinal product and not on the patient (Hepler & Strand, 1990). In their seminal paper published in the US over 25 years ago, Hepler and Strand (1990) proposed that pharmacy's mandate for the twenty-first century is to provide pharmaceutical care. This has been described as

"a patient-centred practice" (Cipolle *et al*, 2004, p. 2) whereby the pharmacist assumes full responsibility for all the patient's medicine-related needs (Sexton *et al*, 2006).

In the UK, the widespread provision of pharmaceutical care became a real possibility in 2003 when legislation was introduced to allow pharmacists to prescribe (Weiss & Sutton, 2009). Initially pharmacists were able to practice as supplementary prescribers within the parameters of a patient-specific Clinical Management Plan (CMP) which had been agreed with a medical independent prescriber (McCann *et al, 2011*, Baqir *et al*, 2015, Bourne *et al*, 2016). However, prescribing rights were extended in 2006 allowing pharmacists to become independent prescribers able to prescribe medication for any condition they deemed within their competency (Bourne *et al*, 2016). Independent prescribing enables pharmacists to assume full responsibility for a patient's medicine-related needs. Legally, pharmacists can commence prescribing training two years' post-registration. Nevertheless, in a small-scale study conducted in England and Scotland, pharmacists who had undergone prescribing training had a mean of 20 years' post-registration experience (range 9 to 30 years) (Weiss & Sutton, 2009). However, if patients are to benefit, it has been recommended that pharmaceutical care is provided routinely by the majority of pharmacists (Jubraj, 2011), not just by those who are very experienced. Pharmaceutical care can entail reviewing and optimising a patient's medicines, and does not necessarily also have to include prescribing, as this activity in itself has been shown to improve patient outcomes (Scullin *et al*, 2012; Graabaek & Kjeldsen, 2013).

At the end of the twentieth century, Bell *et al* (1999) found that community pharmacists in Northern Ireland spent almost 17% of their time providing pharmaceutical care to patients, which they described as an extended patient care service. Most of their time was spent assembling and labelling products. This was classified as a semi-professional (rather than a professional) activity (Bell *et al*, 1999) because, legally, it can be performed by other members of the pharmacy team (pharmacy technicians and dispensing/pharmacy assistants in addition to pharmacists). Ten years later when the study was repeated in the same setting, community pharmacists spent less than 12% of their time providing pharmaceutical care and, again, most of their time was spent assembling and labelling products (McCann *et al,* 2010). The conclusion was that there had been relatively little change in the intervening ten years in the way in which pharmacists spent their time (McCann *et al,* 2010). This was despite the introduction

during that time of pharmacist prescribing training, and also training enabling pharmacy technicians and dispensing/pharmacy assistants to take on additional roles. After this study was conducted, the Department of Health in England introduced initiatives intended to promote extended patient care practice, whereby pharmacists could be commissioned to provide advanced and enhanced services in addition to the essential services offered by all pharmacy contractors (Department of Health, 2013). Advanced services involved reviewing individual patients and optimising their medicines (including the Medicines Use Review (MUR) service), and enhanced services involved health promotion and prevention, and pharmacist prescribing (Department of Health, 2013). Essential services included dispensing medicines, and providing information and advice about medicines. Similar initiatives were introduced in Northern Ireland (Department of Health, Social Services and Public Safety, 2014). Nevertheless, a more recent study using a similar methodology and classification system found that community pharmacists in London spent almost 16% of their time providing pharmaceutical care to patients, and most of their time was still spent assembling and labelling products (Davies *et al*, 2014). These results led the authors of this study to propose that, despite attempts to shift their practice towards patient care activities, pharmacists are still firmly entrenched in traditional dispensing roles (Davies *et al,* 2014). This could be because they are satisfied performing these traditional roles (Braund *et al*, 2012) and are thus resistant to change (Rosenthal *et al*, 2010).

Nonetheless, it is crucial that pharmacists' roles do shift towards extended patient care practice to ensure that health and social care services in Northern Ireland remain safe, resilient and sustainable into the future (Compton, 2011); and also to maximise health outcomes and minimise the risk of harm from medicines use (Department of Health, Social Services and Public Safety, 2015). To support evolving professional practice, the educational approaches used for CPD must also evolve to "ensure that development meets the actual needs of current and emerging practice, rather than that inscribed in earlier times" (Boud & Hager, 2012, p. 27).

2.3 Continuing Professional Development (CPD) for pharmacists

Becoming a professional entails "the securing of a credential to practice" (Houle, 1980, p. 92). This usually involves registration or licensure with a professional regulator prior to professional practice following achievement of specified educational and professional standards (Houle, 1980). In the UK, completing a pharmacy undergraduate degree followed by a pre-registration year in pharmacy practice and an examination set by the pharmacy regulator (either the General Pharmaceutical Council in England, Scotland and Wales, or the Pharmaceutical Society of Northern Ireland in Northern Ireland) enables individuals to register and practise as a pharmacist. Until the late 1960s, it was generally accepted that this initial registration or licensure was a sufficient quality control measure for professionals, and there was an expectation that the individual practitioner would voluntarily keep up to date (Houle, 1980). However, more recent views are that undergraduate education prior to professional registration "is only the beginning of learning" (Webster-Wright, 2009, p. 702). Individuals are now obligated to continue to learn throughout their professional life in order to keep pace with a rapidly changing society (Cross, 1981; Webster-Wright, 2009; Reich & Girdwood, 2012), "since to stand still, to fail to update oneself, is to move backwards" (Reich & Girdwood, 2012, p.157).

Continuing Professional Development (CPD) is now a statutory legal requirement for ongoing registration for all pharmacists registered in the UK (General Pharmaceutical Council, 2011; Pharmaceutical Society of Northern Ireland, 2014). Indeed, CPD policies have been developed and implemented by all the UK healthcare professions. This was in response to the Bristol Royal Infirmary Inquiry, which recommended that "Continuing Professional Development (CPD), being fundamental to the quality of care provided to patients, should be compulsory for all healthcare professionals" (Kennedy, 2001, p. 447). This inquiry found that the mortality rate at Bristol for open-heart surgery on children under one year old was roughly double that of other centres in England. A significant contributory factor to this difference appeared to be that healthcare professionals had not kept up-to-date with contemporary practices, and thus had not maintained their competence in this highly specialised area.

CPD on a voluntary basis has been an established practice in the pharmacy profession for a number of years (Driesen *et al*, 2007; McConnell *et al*, 2010). However, previous

studies conducted in Northern Ireland found that only about a quarter of pharmacists participated in CPD before it became mandatory (Haughey *et al*, 2007). Barriers to participation included lack of time, money, the location and type of courses provided, and a lack of understanding about CPD (Bell *et al*, 2001; Haughey *et al*, 2007). Similar barriers were identified by Donyai *et al* (2011) in their literature review of British pharmacy professionals' beliefs and participation in CPD. They also highlighted additional factors relating to individual motivation. Pharmacists working in primary care were found to be the most motivated to undertake CPD, and community pharmacists were the least motivated (Donyai *et al*, 2011). Shortly after the introduction of mandatory CPD, Power *et al* (2011) identified four factors associated with Scottish pharmacists' views and attitudes to CPD: having positive support in the workplace, having access to learning resources, having confidence in the CPD process, and motivation to participate in the CPD process. Lack of time and money were less problematic in this study, possibly because CPD was mandatory when it was conducted. Power *et al* (2011) found a statistical difference between pharmacists working in different sectors in terms of all four factors. They concluded that community pharmacists needed most support for CPD, and those working in primary care needed least support. It is likely that one of the four factors identified by Power *et al* (2011), having confidence in the CPD process, has become less of an issue over the five years since their study was published, as pharmacists become more familiar with the mandatory CPD system. Therefore, this leaves three main factors which could warrant further exploration in this study, relating to the workplace, individual motivation and learning resources.

With regard to the workplace, pharmacists tend to work in the community, hospital, primary care, academia and industry (Power *et al*, 2011; Donyai *et al*, 2011). Fuller and Unwin (2004a, p. 127) have identified a number of characteristics that can be used to describe workplace environments as "expansive" or "restrictive" in terms of their approaches to workforce development. These characteristics will be used in this study to explore pharmacy workplace environments. Interestingly, Bryson *et al* (2006, p. 291) noted that "proactive individuals" could find learning and development opportunities even in workplace environments that they considered to be restrictive. This would seem to support the suggestion that individual motivation, as well as the workplace environment, can influence CPD. With regard to learning resources, CPD can encompass any kind of learning (Cantillon & Jones, 1999; Power *et al*, 2011;

Neimeyer *et al*, 2012). CPD has been defined as "systematic, ongoing, self-directed learning" (McConnell *et al*, 2010, p. 1585), and all registered pharmacists in the UK must undertake self-directed learning and record their activities in an online portfolio which is assessed by the pharmacy regulator. In common with many healthcare professionals, pharmacists can choose what they learn and how they learn it (Norman, 1999; Cole, 2000; Mathers *et al*, 2012; Neimeyer *et al*, 2012). CPD has been described as "consisting of a patchwork of conceptually varied forms of learning" (Neimeyer *et al*, 2012, p. 482) which Sadler-Smith *et al* (2000) have classified into three main educational approaches: self-directed learning; traditional continuing education (CE) courses and workshops; and work based activities. However, choosing what to learn can be problematic in practice, as people tend to "gravitate to studying things they enjoy and are already pretty good at" (Norman, 1999, p. 887). A more structured approach to what professionals learn is recommended (Norman, 1999). Therefore, this study will consider unstructured and structured educational approaches to pharmacists' CPD.

Watkins and Marsick (1992) have described unstructured learning as informal, occurring during the course of normal daily activities. Indeed, Eraut (2004a) has found that most workplace learning occurs on the job and is informal. Pritchard and Woollard (2010, p. 18) have noted that informal on-the-job learning "is often unintentional rather than deliberate". This type of learning is known as incidental, and is a subset of informal learning, occurring as "a by-product of some other activity" (Watkins & Marsick, 1992, p. 288). Informal and incidental learning are considered to be reactive (Eraut, 2004a), whereby goals are "retrospective speculations following action" rather than "priors to action" (Daniels, 2001, p. 76). Watkins and Marsick (1992) suggest that incidental learning involves action but not reflection. In the pharmacy profession, this type of CPD is referred to as unscheduled learning (Pharmaceutical Society of Northern Ireland, 2014). However, not all unstructured learning undertaken by pharmacists is unscheduled. Much unstructured learning is scheduled, and involves reflection and the identification of individual learning needs (Pharmaceutical Society of Northern Ireland, 2014). Indeed, the Pharmaceutical Society of Northern Ireland (2014, p. 10) requires registrants to "record a predominance of scheduled learning" in their portfolio, and it actively targets pharmacists recording a predominance of unscheduled learning for CPD assessment. Pharmacists in Northern Ireland can choose to meet their identified learning needs by attending traditional continuing education (CE) live

workshops and/or roadshows, or undertaking short distance learning (DL) CE courses (online and/or printed). Therefore, self-directed unstructured learning for these pharmacists is likely to comprise a combination of live and DL CE courses in addition to informal on-the-job learning.

Another form of scheduled learning that is available to pharmacists in Northern Ireland is described in this study as semi-structured learning. In this type of learning, the pharmacist undertakes a short accredited course that is a pre-requisite to the delivery of a specific extended patient care service commissioned by the Department of Health, Social Services and Public Safety. All these short accredited courses use traditional continuing education (CE) distance learning courses, and some also use live (face-to-face) workshops. As completion of a short accredited course enables pharmacists to deliver a specific service, it would be anticipated that the majority of pharmacists who had undertaken semi-structured learning would engage in extended patient care activities in their routine practice.

Structured learning that is “institutionally sponsored” and “classroom-based” has been referred to as formal learning by Watkins and Marsick (1992, p. 288). Traditional continuing education (CE) postgraduate courses incorporating written assignments and a final examination would fit this description. This type of postgraduate course has been available to pharmacists in Northern Ireland for a number of years since the growth of clinical pharmacy in the 1970s and 1980s, and continues to be available. A feature of formal learning, according to Watkins and Marsick (1992), is that it involves reflection but not action. This type of learning has been criticised by Boud and Hager (2012, p. 21) for being “divorced from actual practice”, and they have suggested that what is learnt is not applied routinely in the workplace. If that is the case, then it would be anticipated that no improvement in extended patient care practice compared to self-directed unstructured learning would be seen in this study.

Boud and Hager (2012) have recommended that, in a twenty-first century conception of CPD, learning should be developed in the same context in which it is to be used. This approach is used in two structured work-based learning (WBL) programmes which were introduced in Northern Ireland in 2008: the Foundation Programme and the Advanced Pharmacy Practice Diploma/MSc programme (which also incorporates the non-medical prescribing (NMP) qualification). Both programmes are degree-credit

postgraduate courses and, at the time this study was conducted, were available only to pharmacists working in the hospital sector. These programmes use a structured pathway of activities in a practice setting, as recommended by Billett (2011). However, this does not fit Watkins and Marsick's (1992) classification of formal learning because it involves action in the workplace and is not classroom-based. Indeed, it fits more with their view of informal learning that involves both action and reflection and "takes place in natural, everyday settings" such as the workplace (Watkins & Marsick, 1992 p. 294). However, Watkins and Marsick (1992) have suggested that informal learning occurs during the course of normal daily activities, and is largely unstructured. Eraut (2004a) has proposed an additional category for informal learning that could describe these structured work-based learning (WBL) programmes: "deliberative learning" (Eraut, 2004a, p. 250). In deliberative learning, there is "a definite learning goal" and "engagement in deliberative activities" (Eraut, 2004a, p. 250). Boud and Hager (2012, p. 25) have rather aptly described this deliberative approach to informal learning at work as "formalising the informal". A number of pharmacists working in the hospital sector now undertake these structured work-based learning (WBL) programmes which use practice-based portfolio assessments, rather than the traditional continuing education (CE) postgraduate courses incorporating a written examination. Both WBL programmes focus on the development of practical knowledge and skills in a workplace setting, as recommended by Boud and Hager (2012), in order to deliver safe and effective pharmaceutical care to individual patients. Therefore, it would be anticipated that pharmacists who had undertaken these courses would be more likely to engage in extended patient care activities in their routine practice compared to those who had undertaken self-directed unstructured learning.

Many pharmacists in Northern Ireland choose to do the standalone non-medical prescribing (NMP) course, and do not gain this degree-credit postgraduate qualification as a part of the larger Advanced Pharmacy Practice Diploma/MSc programme. The NMP course uses a hybrid educational approach. There are some workplace practice activities, and a portfolio assessment is used rather than a final written examination. However, there is a classroom-based element to the course, and a number of written assignments to complete. Some pharmacists who have completed a traditional continuing education (CE) postgraduate course choose to go on to do the standalone NMP course. Completion of the NMP course qualifies pharmacists to undertake a specific extended patient care activity: non-medical prescribing. However, McCann *et*

al (2011) found that only approximately 50% of qualified pharmacist prescribers in Northern Ireland were prescribing in practice. They identified three main barriers to implementing pharmacist prescribing: inadequate funding for the prescribing role, meaning it was not financially viable for some pharmacists to give up core roles to do this; inadequate resources to cover core services if they did decide to prescribe; and onerous paperwork associated with the Clinical Management Plan (CMP). However, they concluded that the latter was no longer an issue because the introduction of independent prescribing rights for pharmacists, as discussed in section 2.2, meant that CMPs were no longer required. Indeed, more recently, Bourne *et al* (2016) have noted that the main barrier was the limited numbers undertaking the NMP course; and although only approximately 10% of UK pharmacists had qualified as independent prescribers, the majority of those (approximately 85%) were routinely practising as such. Thus it was anticipated in this study that the majority of pharmacists who had completed the NMP course would be engaging in extended patient care activities in their routine practice.

The other structured form of CPD that some pharmacists choose to do is a doctorate programme (PhD or a Professional Doctorate in Pharmacy (DPharm)). The educational approach for doctorate programmes would largely entail self-directed learning.

Therefore, in Northern Ireland the approach to pharmacists' CPD is not a strict unstructured / structured dichotomy. Rather, CPD falls within three main categories: unstructured learning (self-directed learning which can incorporate a combination of informal on-the-job learning, live workshops and/or roadshows and short distance learning courses); semi-structured learning (short accredited courses that are a pre-requisite to service delivery); and structured learning (traditional continuing education (CE) postgraduate courses, structured work-based learning (WBL) programmes, the standalone non-medical prescribing (NMP) course, and doctorate programmes).

2.4 The link between CPD and professional practice

As noted earlier, since the studies by Bell *et al* (1999) and McCann *et al* (2010) were conducted, CPD for pharmacists has become mandatory in the UK. As mentioned in section 2.3, the Bristol Royal Infirmary Inquiry made the assertion that CPD is fundamental to the quality of patient care (Kennedy, 2001). Nonetheless, Kanter (2011a, p. 1) has highlighted that understanding the link between CPD and patient care "is a challenge that is shared by all medical educators around the world", and this prompted him to pose the "2011 Question of the Year: What improvements in medical education will lead to better health for individuals and populations?". He received over 120 submissions in response to this question, and 15 were selected for publication (Kanter, 2011b). Of these, 14 made suggestions and recommendations relating to medical education, and only one (McGaghie *et al*, 2011) discussed the impact medical education had on patient outcomes. This referred to a simulation-based learning programme on central venous catheter insertion for doctors working in an intensive care unit which was shown to reduce the incidence of catheter-related bloodstream infections in patients (Barsuk *et al*, 2009). However, Mathers *et al* (2012) have indicated that, although some discrete CPD initiatives such as this which relate to specific service improvements have shown short term benefits, the more holistic relationship between CPD participation and the impact on patients has not been objectively assessed. They have suggested that this may be because too many variables would need to be taken into account to assess the impact of CPD on patient outcomes (Mathers *et al*, 2012). Indeed, more recently, Whitcomb (2016, p. 619) has concluded that "there is simply no meaningful way to relate the quality of the care provided by physicians to specific continuing medical education experiences". Hence the link between CPD and the quality of patient care is implicit rather than explicit.

Interestingly, improved patient care is not explicitly stated as the purpose of CPD in UK healthcare professions' CPD policies; rather, the stated purpose is to improve professional practice, and this is then assumed to improve patient outcomes (Cole, 2000; Cleary *et al*, 2011; Donyai *et al*, 2011; Power *et al*, 2011). The relationship between CPD and professional practice would seem to be more straightforward to assess than the link between CPD and patient outcomes. However, Cole (2000, p. 28) has observed that "completion of CPD activity in no way guarantees that the individual is competent". This was illustrated in a study of hospital pharmacists in England, which

could not demonstrate that undertaking CPD activities and recording them in a portfolio contributed to enhanced practice (Kostrzewski *et al*, 2009). Indeed, over thirty years ago Todd (1984, p. 89) acknowledged that, although "the need to continue learning in order to maintain a high standard of professional performance is an obvious one", the resulting benefits cannot always be readily quantified. In addition, although Mathers *et al* (2012, p. 38) observed "a strong belief that CPD does have a positive effect on doctors' practice and performance", they found little evidence of this in their study. Thus there is a gap in the literature regarding the measurement of CPD and enhanced professional practice, possibly because both are complex and multi-factorial in nature with a number of different variables that need to be taken into account (Mathers *et al*, 2012; Neimeyer *et al*, 2012). Nonetheless, there are increasing pressures across the professions to ensure that the educational approaches used for CPD will enhance practice, and thus improve outcomes for clients (Webster-Wright, 2009; Carraccio *et al*, 2016). In this study, a comprehensive tool was sought to assess the various different CPD activities and professional practices that pharmacists engaged in, to try to determine the implications that the former had for the latter. This tool is discussed in more detail in chapter 5.

Boud and Hager (2012) have suggested that there is a reciprocal relationship between CPD and professional practice, whereby practices (and workplace environments) can influence CPD, and CPD can influence practices (Boud & Hager, 2012). As mentioned earlier, they have indicated that a twenty-first century conception of CPD needs to be located in the practices that professionals engage in; that is, which practices they undertake in the workplace, since "it is the practice itself that ultimately matters in terms of getting things done in the world" (Boud & Hager, 2012, p. 26). However, they acknowledge that "CPD routinely is divorced from actual practice" (Boud & Hager, 2012, p. 21) and this can mean that what is learnt is not applied in the workplace. They make the pragmatic assertion that "it does not matter what the professional knows or can do if this is not deployed appropriately in a particular context" (Boud & Hager, 2012, p. 26). They have called for "studies of how professionals actually learn and how environments in which they operate influence them and the practices in which they engage", in order to gain a "fuller notion of CPD" (Boud & Hager, 2012, pp. 27-8). This study will consider the various different types of CPD activities that pharmacists undertook and the implications this had for the professional practices they engaged in, to try to ascertain whether learning had been applied in the workplace. Issues relating

to expansive and restrictive workplace environments and individual motivation will also be explored.

2.5 Conclusion

Pharmacy professional practice needs to evolve towards extended patient care activities in order to meet the current and future needs of patients (Compton, 2011; Donaldson *et al*, 2014). However, previous studies have indicated that pharmacists are still firmly entrenched in traditional semi-professional dispensing roles that can be performed by any member of the pharmacy team (Bell *et al*, 1999; McCann *et al*, 2010; Davies *et al,* 2014). Continuing Professional Development (CPD) policies have been developed and implemented by all the UK healthcare professions, including pharmacy, to improve professional practice. All registered pharmacists in the UK must undertake self-directed unstructured learning, and can choose what they learn and how they learn it. However, a more structured approach to what professionals learn has been recommended (Norman, 1999). This study will consider unstructured and structured approaches to pharmacists' CPD, and whether more structured approaches have an impact on the professional practices they engaged in. With regard to how professionals learn, the many different forms of CPD have been categorised into three main educational approaches (Sadler-Smith *et al*, 2000): self-directed learning; traditional continuing education (CE) courses and workshops; and work based activities. This range of educational approaches for CPD is available to pharmacists in Northern Ireland, and will also be explored in this study.

There are increasing pressures across the professions to ensure that the educational approaches used for CPD will enhance practice (Webster-Wright, 2009; Carraccio *et al*, 2016). In this study, enhanced practice for pharmacists was taken to be improved engagement in extended patient care activities, in accordance with current healthcare policy recommendations in Northern Ireland (Compton, 2011; Donaldson *et al*, 2014; Department of Health, Social Services and Public Safety, 2015). Boud and Hager (2012) have suggested that CPD should be located in the practices that professionals engage in to ensure that learning is applied in the workplace. Therefore, the focus of this study is to investigate the different CPD activities that pharmacists undertook and the implications this had for the various professional practices they engaged in, including whether they undertook any extended practice. Interestingly, there is little

evidence in the literature to demonstrate that CPD has a positive effect on professionals' practice. This could be because both CPD and professional practice are complex and multi-factorial in nature with a number of different variables to be taken into account. For this reason, a comprehensive tool was sought to assess CPD and professional practice in this study. In addition, a previous study (Power *et al*, 2011) highlighted three main factors associated with Scottish pharmacists' views and attitudes to CPD, relating to the workplace, individual motivation and learning resources. This study will examine whether pharmacists' attitudes towards CPD, pharmacy practice and their working environment impacted on the CPD activities and professional practices that they engaged in. The implications of the findings of the study for the educational approaches for pharmacists' CPD will then be considered.

CHAPTER 3: UNDERSTANDING CPD: THE CONTRIBUTION OF LEARNING THEORIES

3.1 Introduction

This chapter considers the contribution of learning theories to the different educational approaches that are used for pharmacists' CPD. Learning theories provide explanations of what happens in the learning process (Merriam *et al*, 2007). As discussed in chapter 2, all registered pharmacists in the UK must undertake self-directed, unstructured learning, and can choose what they learn and how they learn it. However, a more structured approach to what professionals learn has been recommended (Norman, 1999). This chapter provides an overview of the learning theories which underpin the different educational approaches used for pharmacists' CPD in Northern Ireland. Sections 3.2 and 3.3 consider the learning theories underpinning self-directed learning and informal (unstructured) on-the-job learning respectively. Sections 3.4 and 3.5 outline the learning theories underpinning the more structured forms of learning used for pharmacists' CPD; that is traditional continuing education (CE) courses and workshops, and structured work-based learning.

3.2 Self-directed learning – a humanist approach

The concept of CPD has long been associated with self-directed learning and this, in turn, is associated with adult learning theory (Cantillon & Jones, 1999). The most well-known theory of adult learning has been developed by Knowles and belongs to the humanist group of learning theories (Merriam *et al*, 2007). Knowles (1980, p. 37) proposed that adults are "more than just grown-up children", suggesting that they learn differently from children and should therefore be taught differently. Nevertheless, over forty years ago, his view was that most adults, including those in professional training, had been taught as if they were children (Knowles, 1973). At this time he lamented that we "know more about how animals (especially rodents and pigeons) learn than about how children learn: and we know much more about how children learn than about how adults learn" (Knowles, 1973, p. 12), and he focused his work on trying to rectify this. He later argued that adult educators should reject pedagogy ("the art and science of teaching children" (Knowles, 1980, p. 40)) in favour of andragogy ("the art

and science of helping adults learn" (Knowles, 1980, p. 43)). His andragogical model made the following four assumptions about the characteristics of learners (Knowles, 1980). As individuals mature their self-concept moves from being dependent towards being self-directed; they accumulate experience that becomes a rich resource for learning; their readiness to learn becomes orientated towards the developmental tasks of their social roles; and their orientation to learning shifts from being subject-centred with a postponed application of knowledge towards being performance-centred with immediate application. In her critique of Knowles' theory of andragogy, Hartree (1984) indicated that, as a theory of adult learning it was incomplete, since it addressed how adults learn and what they learn, but not why they learn (Hartree, 1984). Knowles (1984) subsequently added in a fifth assumption about the characteristics of adult learners to address this perceived deficiency: their motivation to learn moves from being motivated by external pressures to being motivated by internal pressures. Knowles (1980) has postulated that pedagogical and andragogical models are probably not dichotomous, but at two ends of a spectrum with a less extreme middle ground. However, Cross (1981) has disputed whether a continuum from pedagogy to andragogy really does exist since, although there may be a spectrum for some andragogical assumptions such as experience, others such as problem-centred versus subject-centred learning are probably more dichotomous.

There is a considerable body of support for Knowles' first assumption that learners become more self-directed as they mature. Indeed, Kuhn and Pease (2006) have proposed that the learning process itself could potentially develop with maturity. More recently, Green *et al* (2013, p. 262) found that experienced teachers in Australia had a strong sense of agency and self-directed learning, and suggested it is "possible that the nature of, and orientation towards one's professional learning changes significantly over time". Grow (1991) concurs with this view, and has suggested that the educational approach used should be matched to an individual's stage of development. Tennant (1986, p. 114) believes this means that individuals "need to be weaned away from traditional educational consumption". This resonates with the first recommendation in Mezirow's (1981, p.21) charter of andragogy, which is that andragogy must "progressively decrease the learner's dependency on the educator". However, others disagree, believing that many adult students feel a need for, and often expect, dependency and tutor direction (Hartree, 1984). Interestingly, Bryson *et al* (2006, p. 293) have suggested it is "a trap to assume that all workers have the

confidence or initiative to advocate for their own development". Sadler-Smith *et al* (2000, p. 94) agree, proposing that "while self-directedness is a desirable condition of human existence it is seldom found in any abundance". Merriam *et al* (2007) have a more pragmatic view, suggesting that self-directed learning is situational, and adults can be self-directed in some situations but not in others. Autonomy is at the heart of self-directed learning, and has been defined as "the possession of an understanding and awareness of a range of alternative possibilities" (Brookfield, 1986, p. 59). Sadler-Smith *et al* (2000) agree that autonomy entails the exercising of choice, but indicate that self-direction is not the same as autonomy. They note that self-direction can be imposed, for example by a system requiring professionals to undertake self-directed CPD for ongoing registration (Sadler-Smith *et al*, 2000). Such a system is in place for pharmacists in the UK. As discussed in chapter 2, all registered pharmacists must undertake self-directed learning, and can choose what and how they learn. Autonomy can mean that many learners choose dependent methods, because these are the methods that are familiar to them (Sadler-Smith *et al*, 2000). Indeed, in Northern Ireland, many pharmacists choose to undertake traditional continuing education (CE) courses and workshops to meet their individual learning needs.

From a humanist perspective, the motivation to learn is to increase understanding and to develop as an individual (Cross, 1981; Merriam *et al*, 2007). The assumption is that there is a natural tendency for adults to learn voluntarily, so there is no need for a teacher or manager to intervene (Cross, 1981). As andragogy focuses on the individual learner, there have been some suggestions that the sociohistorical context in which learning takes place can be overlooked (Merriam *et al*, 2007). As highlighted in chapter 2, the environment in which an individual works could potentially have an influence on their CPD. Indeed, context is thought to be an important dimension of human learning (Illeris, 2009). Therefore this omission from the andragogical model is considered by some to be its main flaw (Merriam *et al*, 2007). Some have gone further, claiming that andragogy is not a learning theory at all, but rather a set of assumptions about adult learners (Brookfield, 1986). Tennant (1986, p.114) has also suggested that andragogy should be viewed as a "guide to assist adult learners towards self-direction", and is not necessarily a learning theory. Despite its shortcomings, andragogy continues to be the most popular and widely used theory of adult learning (Merriam *et al*, 2007) "in an otherwise barren field" (Cross, 1981, p. 225); possibly because, as suggested by Grow (1991, p. 127) "a theory does not have to be right to be useful".

3.3 Informal on-the-job learning – a social/situated approach

All pharmacists can undertake informal on-the-job learning, which is unstructured and occurs as part of their day-to-day practice. The learning theory associated with this approach to CPD is social/situated learning (Wenger, 2009). In the social/situated approach, the learner aims to become a full participant in their community of practice (Lave & Wenger, 2002). This is achieved by a process of peripheral participation where the individual participates in "peripheral, less intense, less complex, less vital tasks" initially and gradually takes on more difficult and risky tasks (Lave and Wenger, 2002, p. 114). In this approach, learning is seen as a progression from newcomer to full participant or novice to expert, and is based on the historic apprenticeship model which was "typical of the craft guilds of the Middle Ages" (Pritchard & Woollard, 2010, p. 56). It has been suggested that peripheral participation is a vertical learning process which aims to elevate individuals upward to higher levels of competence (Engeström, 2001). However, others have suggested that the unstructured nature of social/situated learning offers flexibility that could potentially facilitate "a range of development trajectories" incorporating "a combination of horizontal and vertical dimensions of professional skill development", as recommended by Dall'Alba and Sandberg (2006, p. 406). Indeed, a key feature of a community of practice, according to Lave and Wenger, is that there is no formal curriculum; a learning curriculum unfolds from the practice of the community rather than being constructed by the "master" (Lave & Wenger, 2002, p. 114). Lave and Wenger (2002) noted very little observable teaching in this model; rather, the basic phenomenon was learning. They have described the lack of human mediation in this model as "benign community neglect" (Lave & Wenger, 2002, p. 11).

Lave and Wenger's (2002) legitimate peripheral participation model is "one of the dominant theories applied to learning in the workplace" (Rainbird *et al*, 2004, p. 40), and is widely used for continuing professional learning at all levels (Green *et al*, 2013). The motivation to learn in social/situated learning is to become a full participant in a community of practice (Lave & Wenger, 2002). Sfard (1998) has used the participation metaphor to describe learning in this approach. Here, learning involves the construction of identities rather than meaning (Green *et al*, 2013), and becoming a member of a community of practice replaces learning a subject (Sfard, 1998). Scribner (1999) has observed that individuals undertaking different roles within a workplace learn and know different things depending on what is salient to their job role. This has led her to conclude that what individuals learn at work is bound up with what they have

to do (Scribner, 1999). However, Noble and Hassell (2008) found that junior hospital pharmacists in north west England who used this approach were unsure of their learning goals, indicating that their learning was largely reactive. The lack of a formal curriculum was perceived to be a barrier to their learning (Noble & Hassell, 2008).

Despite its wide use, the legitimate peripheral participation model has received a number of criticisms. Engeström (2001), for example, has challenged it for being too simplistic because it does not account for learning that occurs across boundaries when problems arise, particularly in complex changing working environments. Fuller *et al* (2005) agree, and argue that this model has a number of significant limitations to complex contemporary workplaces; one of which is that it regards communities of practice as unchanging. Indeed Rainbird *et al* (2004, p. 40) have indicated that Lave and Wenger's model is suitable only for learning in simple work environments, since "the theory was developed, in their own words, to examine craft or 'craft-like' forms of production". Pharmacy workplace environments could not be described as simple and, as discussed earlier, the Pharmaceutical Society of Northern Ireland (2014) recommends that pharmacists do not rely solely on this type of unscheduled informal on-the-job learning for their CPD. Interestingly, Sfard (1998) has highlighted that, in learning environments which are less directive and where the participation metaphor dominates, there is the potential for gradual erosion of subject matter in some areas to occur. Another potential problem with theories of social/situated learning is that they "tend to stress the consensual and participative nature of learning at work" (Rainbird *et al*, 2004, p. 38), and fail to explore the significance of conflict and unequal power in the workplace (Billett, 2004; Fuller *et al*, 2005). These issues imply that workplace learning experiences and participation may need to be constructed, rather than taken as a given, in order to facilitate learning (Billett, 2004; Rainbird *et al*, 2004).

3.4 Traditional continuing education (CE) courses and workshops – a cognitivist approach

As indicated earlier, pharmacists in Northern Ireland have had access to formal traditional postgraduate CE courses for almost thirty years. They are also able to access a range of CE courses and workshops for their own self-directed CPD. In addition, any short accredited courses that are a pre-requisite to service delivery use this approach. The learning theory associated with this approach to pharmacists' CPD is cognitivism in so far as the learner's mind is assumed to be "a tabula rasa, a blank slate" (Bruner, 1999a, p. 12), and the learner is viewed as a passive rather than an active participant in the learning process (Gray & MacBlain, 2012) who learns by "passively sitting still and absorbing knowledge" (Bredo, 1999, p. 30). A "dominant metaphor" in cognitivism, according to Lefrançois (1995, p. 187), is information-processing: a "computer-based metaphor". In this computational view, cognition is seen as symbol-processing, where intelligence is akin to a computer performing rule-based operations on symbols which model objects in the external world (Bredo, 1999). Thus cognitivism deals with higher mental functions (Lefrançois, 1995).

In cognitivism, knowledge is viewed as being abstract (Hager, 2004). The learner's experience is considered to be of little worth; it is the experience of the teacher or books that counts and transmittal techniques are used to teach factual knowledge (Knowles, 1980). Bruner (1999a, p. 11) has referred to this teaching approach as "didactic exposure", where individuals are presented with facts to learn and remember. The learner's mind is assumed to be "a receptacle waiting to be filled" (Bruner, 1999a, p. 12); with "knowledge as a type of substance" to be placed in that "container" (Hager, 2008, p. 679). This approach has been at the heart of formal educational systems, and is viewed as the "standard paradigm of learning" (Hager, 2004, p. 243). The focus in the standard paradigm of learning is on "an individual human mind steadily being stocked with ideas" (Hager, 2004, p. 243); and the product of learning is more ideas stocked in the mind. Because knowledge here is abstract and learning is focused on thinking rather than action, it becomes a solitary, individualistic process "where the learner becomes a spectator aloof from the world" (Hager, 2004, p. 243). This abstract knowledge can be displayed in a textual form (Hager, 2004), and has been described as "codified knowledge" (Eraut, 2004b, p. 202). This is assumed to confer transparency making it explicit and universal for everyone who reads it (Hager, 2004).

Another assumption is that knowledge is context-independent and stable over time (Hager, 2004). Interestingly, Merriam *et al* (2007) have suggested that this approach is used in adult education to preserve the status quo. Houle (1980, pp. xi-xii) concurs with this view, but is wary of using this model for CPD, noting that "a greatly heightened level of professional thought and behaviour can never be accomplished by merely spreading present knowledge more widely".

In the computational approach, learning involves the transmission of subject matter to students (Bredo, 1999; Bruner, 1999b). Thus learning centres on the acquisition of factual statements or propositions (Hager, 2008). This fits with Sfard's (1998, p. 5) "acquisition metaphor", where knowledge is considered to be a commodity that can be acquired, and becomes the property of the individual. This is a pedagogical orientation, where learning is a process of acquiring subject matter content which will be useful only at a later time in life (Knowles, 1980). The assumption here is that theory is acquired prior to practice (Hager & Butler, 1996). However, as discussed earlier, Boud and Hager (2012) have expressed concerns that the abstract knowledge learnt in this approach is not applied routinely in the workplace. Indeed, this independence of theory and practice has been highlighted as problematic, particularly in the healthcare sector; specifically in the nursing, physiotherapy, medical and pharmacy professions (Spouse, 1998; Cole, 2000; Mulder *et al*, 2010; Alexander, 2010). Clearly, the ability to memorise "prodigious amounts of factual propositional knowledge" (Hager & Hodkinson, 2009, p. 623) does not necessarily mean that the individual can apply that knowledge effectively in practice. Cole (2000) has illustrated this by noting that someone who can recite the rules of chess may not be able to play chess; however, someone who can play chess is considered to know the rules, even if they can't recite them all, because they are able to apply them in practice. Therefore, "the 'knowing' is demonstrated in the effective 'doing' of an activity" (Cole, 2000, p. 30).

Orientation to learning in cognitivism is subject-centred, and the curriculum is organised in subject-content units (Knowles, 1980). Ability in this approach is the recall of factual knowledge (Bruner, 1999b). Thus it is presumed that an individual knows the subject matter if they can reproduce the same symbols that are in a book, or in the teacher's head (Bruner, 1999a; Bredo, 1999). This approach has been criticised by some, as it is thought to promote a "quiz show view of learning", where the individual memorises information and then answers questions on the subject area; all questions

are assumed to have a correct answer, and the more questions answered correctly, the greater the learning achievement (Hager & Hodkinson, 2009, p. 623). In the pharmacy profession, it has been suggested that the use of this approach can promote "bulimic learning" (Zorek *et al*, 2010, p. 1). This is where students are expected to memorise all the information relevant to a specific subject area; they are examined on this information and then move on to another subject area. The outcome of this bulimic learning, according to Zorek *et al* (2010, p. 1), is that "students are caught in a seemingly endless cycle of memorization and regurgitation". This creates an environment where students never get beyond remembering information, and little attention is paid to the long-term retention of knowledge and skills necessary to competently practise pharmacy (Zorek *et al*, 2010).

For cognitivists, readiness to learn is dependent on the individual's cognitive stage of development (Merriam *et al*, 2007). Therefore, maturational changes determine what can and will be learned at different stages of an individual's development (Swenson, 1980). Development is thought to be spontaneous and to precede learning (Swenson, 1980). The assumption here, then, is that the individual needs to have developed to a certain level of maturity before they are ready to learn at that level. This is based on Piaget's theory of cognitive development in children which proposes that a child's development follows a series of stages which they must pass through sequentially (Gray & MacBlain, 2012). Each stage has major characteristics and achievements and, although the chronological age of the child is intended to be approximate, the order of stages is fixed (Richmond, 1970). Each stage provides the foundation for the next level, and it is acknowledged that not all children will reach the end of the sequence (Richmond, 1970). In cognitivism, individuals are thought to be motivated by external pressures, such as achievement of qualifications and competition for grades (Knowles, 1984). The aim is to acquire a certificate or another tangible commodity to demonstrate their achievement (Sfard, 1998).

3.5 Structured work-based learning – a constructivist approach

As discussed in section 2.3, since 2008 hospital pharmacists in Northern Ireland have had access to two structured work-based learning programmes (the Foundation and Advanced Pharmacy Practice Programmes) which formalise the informal. The learning theory associated with this educational approach is constructivism in so far as the individual learns by engaging in social activity; learning is not an individualistic process (Pritchard & Woollard, 2010). A central concept in constructivism is the zone of proximal development, or ZPD, developed by Vygotsky (Pritchard & Woollard, 2010). The ZPD "presupposes an interaction on a task between a more competent person and a less competent person, such that the less competent person becomes independently proficient at what was initially a jointly accomplished task" (Chaiklin, 2003, p. 41). Daniels (2001, p. 106) has referred to this type of instruction and support within Vygotsky's ZPD model as "scaffolding". Wood *et al* (1976) first used the term scaffolding to describe a process of adult assistance that enables a child or novice to achieve a goal which would be beyond their unassisted efforts. Kozulin (2003) has since described scaffolding as a technique of mediation, where the type of mediation can be human or symbolic (using tools and signs). It has been suggested that the use of highly structured learning materials does not warrant intensive human mediation, because meaning is embedded in those materials (Kozulin, 2003). This symbolic approach is used in the Foundation and Advanced Pharmacy Practice Programmes; although individuals are allocated mentors to support them as they undertake the course, structured practice activities are widely used which encourage self-directed learning. However, Daniels (2001, p. 59) has noted that this type of scaffolding can be construed as a one-way process where the "scaffolder" constructs a scaffold and presents it for use to the learner. This has been criticised by some who see the "donation of a scaffold as some kind of prefabricated climbing frame", rather than a process which creates a ZPD through negotiation (Daniels, 2001, p. 59). Situations that are not highly structured need greater human mediation (Kozulin, 2003), and this could enable greater negotiation with regard to the creation of a ZPD. Indeed, this has been seen in the coteaching model described by Murphy *et al* (2015), where teachers share responsibility for students' learning. The first stage of coteaching is coplanning which entails coteachers identifying what constitutes ideal and real forms of practice in their setting, and using this to produce a collaborative ZPD (Murphy *et al*, 2015). Despite receiving criticisms, Daniels (2001) believes that the use of scaffolded instruction is beneficial overall, and can result in faster and better maintenance of

learning compared to non-scaffolded instruction. The level of support should be gradually withdrawn as the learner progresses, until independent performance is achieved (Pritchard & Woollard, 2010). However, Sadler (2007) has warned that using a combination of clear goals, scaffolding and comprehensive assistance can make it difficult to ascertain whether independent performance has actually been achieved. He has stipulated that scaffolding needs to be a temporary arrangement, as it is in a building process, and should be dismantled after it has done its job allowing the building to stand on its merits (Sadler, 2007).

A constructivist approach to learning is where "it is highly desirable that the context in which the learning is developed is the same as the context in which the knowledge is to be used" (Pritchard & Woollard, 2010, p. 37). This fits with Boud and Hager's (2012) twenty-first century conception of CPD, which they suggest needs to be located in the practices that professionals engage in. In a constructivist approach, experience is considered to be a rich resource for learning, and techniques such as problem-solving are used (Knowles, 1980). However, Billett (2002, p. 462) has highlighted that, in the workplace, "opportunities to participate in and access support and guidance are not always uniformly distributed". This could be because, in most workplaces, education and learning is considered to be secondary to providing a service (Houle, 1980). Billett (2004, p. 114) has referred to the combination of opportunity and support as "workplace affordances". Supportive workplace environments are thought to foster learning at work (Fuller & Unwin, 2004a). Interestingly, Fuller and Unwin (2004a, p. 127) have suggested that supportive, or "expansive", workplace environments can be created to smooth out individual differences and foster a more even take up of opportunities. Billett (2011, p. 26) recommends creating expansive workplace environments by organising and sequencing experiences in a practice setting, which he has referred to as "structuring a pathway of activities". However, even in expansive environments, individuals can choose whether or not to engage in workplace practices (Billett, 2004). Thus, Billett (2002, p. 466) has proposed that workplace practices are "co-participative"; that is, they are "a relationship constituted between the affordance of the work practice and how individuals elect to engage in the work practice".

In constructivism, learning is a process of constructing meaning from experience (Merriam *et al*, 2007). Watkins and Marsick (1992, p. 290) have suggested that "learning and experience are not synonymous", and "there are two key ingredients

needed to *learn from* experience rather than just *have* experience: action and reflection". As discussed in section 2.3, "deliberative learning" is used in the structured work-based learning programmes that are available to hospital pharmacists in Northern Ireland, whereby there is "a definite learning goal" and "engagement in deliberative activities" (Eraut, 2004a, p. 250). This is analogous to Ericsson's (2004, p. S70) "deliberate practice", which involves setting learning goals that exceed the individual's current level of performance: a Vygotskian approach. This approach adopts an interactionist view to learning, which assumes that the environment can shape growth and "that education can play a critical role in 'pulling' the individual into even higher levels of development" (Cross, 1981, p. 229). In this view, "developmental interactionists" actively decide "what kinds of learning experiences are most likely to advance the individual to the next stage of growth" (Cross, 1981, p. 230). The use of experience to pull an individual into higher levels of development assumes that the developmental process follows learning (Rosa & Montero, 1990), and instruction must move ahead of development if it is to be useful (Daniels, 2001). This has been described as "performance before competence" (Cazden, 1981; cited in Moll, 1990, p. 3), and is crucially different from the Piagetian approach discussed earlier, where development is thought to precede learning (Swenson, 1980). Interestingly, Houle (1980, p. 209) has said of this approach that "experience is a hard teacher because it gives the test first, the lesson afterwards". This makes learning in the constructivist approach a more uncomfortable experience for the learner compared to learning in the cognitive approach.

For constructivists, motivation to learn is to develop increased competence (Merriam *et al*, 2007). Learning is task or problem-centred, and the curriculum is organised around competency-development categories (Knowles, 1980). The development of competence has been described by the Dreyfus model, which is "one of the most advanced and influential models of skill acquisition" (Dall'Alba & Sandberg, 2006, p. 386). This model has been widely used in the healthcare sector, particularly in the nursing profession (Benner, 2004). It has five stages of competency-development: novice, advanced beginner, competence, proficiency and expertise (Dreyfus, 2004). However, not everyone develops expertise; some individuals do not get beyond competence level (Benner, 2004). Indeed, Dall'Alba and Sandberg (2006, p. 395) have indicated that a "limitation of stage models of development concerns their difficulty in accounting for the achievement of expert status by some but not by others, even

committed individuals with extensive experience". This is supported by Ericsson *et al* (2007, p. E60) who studied expert performance in nursing and found that "the number of years of experience in a domain is typically a poor predictor of attained performance". Development towards expertise appears to entail continually setting and achieving goals which exceed the individual's current level of performance (Ericsson, 2004), and "professionals rise to the level at which they no longer learn how to deal with the problems they confront" (Houle, 1980, p. 103). Dall'Alba and Sandberg (2006) have referred to the development of more advanced skills as progression in the vertical dimension. They contrast this with progression in the horizontal dimension, which involves the development and honing of existing skills (Dall'Alba & Sandberg, 2006). The honing of existing skills is associated with a behaviourist rather than a constructivist approach (Gray & MacBlain, 2012). In behaviourism the focus is on "practice makes perfect" (Woollard, 2010, p. 45). This is a popular technique in competitive pursuits such as sports or music, whereby individuals repeat tasks to refine their knowledge and skills (van der Weil *et al*, 2011a). In this dimension, the amount of time an individual spent practising a task was directly related to their level of performance (van der Weil *et al*, 2011b). However, the result of this focus on perfecting current practice can be automation and the maintenance of a mediocre level of performance, rather than advancement in the level of performance (Ericsson, 2004). Conversely, constructivism focuses on setting learning goals that exceed the individual's current level of performance to develop more advanced skills, and this does not seem to depend solely on the length of an individual's experience (Ericsson *et al*, 2007). This suggests that it could be possible to expedite the development of more advanced skills by using a developmental interactionist approach.

3.6 Conclusion

Adult learning theory and humanism underpin self-directed learning. In humanism it is assumed that there is a natural tendency for adults to learn voluntarily to increase their understanding and to develop as an individual (Cross, 1981; Merriam *et al*, 2007). However, some have suggested that adult students find this difficult in practice (Hartree, 1984; Sadler-Smith *et al*, 2000; Bryson *et al*, 2006). Self-direction can be imposed, for example by a system requiring professionals to undertake self-directed CPD for ongoing registration (Sadler-Smith *et al*, 2000). Such a system is in place for pharmacists in Northern Ireland. Many learners choose to undertake traditional continuing education (CE) courses and workshops, because these are the methods that are familiar to them (Sadler-Smith *et al*, 2000).

Informal (unstructured) on-the-job learning work is linked to a social/situated approach. This approach offers flexibility to the learner (Dall'Alba & Sandberg, 2006) as there is no formal learning curriculum (Lave & Wenger, 2002), and is widely used for CPD (Rainbird *et al*, 2004; Green *et al*, 2013). However, some pharmacists have found the lack of a formal curriculum to be a barrier to their learning (Noble & Hassell, 2008). Indeed, the Pharmaceutical Society of Northern Ireland (2014) has recommended that pharmacists do not rely solely on this type of unscheduled learning for their CPD.

Cognitivism underpins traditional CE courses and workshops. Here, knowledge is viewed as being abstract (Hager, 2004), leading some to suggest that it is not applied routinely in the workplace (Boud & Hager, 2012). In cognitivism, development precedes learning, so the individual must first develop to a certain level of maturity and then they will be ready to learn at that level (Swenson, 1980).

Structured work-based learning resonates with a constructivist approach. It is thought that learning is more likely to be applied routinely in practice with this approach (Boud & Hager, 2012) because it is developed in the same context in which it is to be used (Pritchard & Woollard, 2010). Workplace environments that are supportive or expansive are thought to foster learning at work (Fuller & Unwin, 2004a). However, even in expansive environments, individuals can choose whether or not to engage in workplace practices (Billett, 2004). In constructivism, learning precedes development (Rosa & Montero, 1990; Daniels, 2001) making learning in this approach more

uncomfortable and challenging for the learner compared to learning in the cognitive approach (Houle, 1980).

Interestingly, Watkins and Marsick (1992, p. 290) have indicated that “there is no formula that guarantees learning”. Chivers (2010, p. 127) agrees, and has cautioned against “being too prescriptive in respect of ‘best-practice’ learning methods” and against “too rigid an adherence to any particular theoretical approaches”. Others disagree, however, and recommend a developmental interactionist approach to learning, where a learning curriculum and the learning experiences needed to advance individual development are specified (Cross, 1981). This study will consider whether the educational approach that pharmacists used for their CPD influenced the professional practices they engaged in.

CHAPTER 4: METHODOLOGY

4.1 Introduction

This study investigates the CPD activities that pharmacists engaged in and the implications this had for their professional practice. This chapter outlines the research aim and questions and gives a summary of the research approach. It includes details of the methods used, including construction of the questionnaire. It concludes with a discussion of the ethical considerations associated with the study.

4.2 Research aim and questions

The main aim of the study was to investigate the CPD activities that pharmacists engaged in and the implications this had for their professional practice.

The main research questions were:

1. Are pharmacists' professional practices influenced by the CPD activities they engage in?
2. Do pharmacists' attitudes towards CPD, pharmacy practice and their working environment impact on the CPD activities and professional practices that they engage in?
3. What implications do these findings have for the educational approaches for pharmacists' CPD?

4.3 Research approach

A postpostivitist methodological approach was used in this study. The methodological approach to research is influenced by the research paradigm (Cohen *et al,* 2011; Mackenzie & Knipe, 2006; Creswell, 1998) which, in turn, is influenced by assumptions about the nature of the reality (ontology) and how it can be understood (epistemology) (Hammersley, 2012). There are many different ontological and epistemological stances that a researcher can take (Creswell, 1998). Bryman (2008) has described two main ontological positions regarding the nature of reality: objectivism and constructionism (also known as constructivism). Objectivism implies that social entities have a reality that is external to, and independent of, social actors. This perspective is

concerned with realism (Hammersley, 2012), and research entails discovering reality or uncovering the truth. Conversely, constructionism asserts that social phenomena and their meanings are continually being produced and revised by social actors through social interaction. In this perspective research is concerned with relativism (Hammersley, 2012), and entails interpreting and understanding the perceptions and actions of the individuals involved in constructing and revising social entities. In a postpositive methodological approach, reality is objective but not perfectly knowable (Costley *et al*, 2010). This corresponds with the recognition in this study that there was not an absolute truth that could be uncovered (Hammersley, 2012; Hartas, 2010), and that the responses from the study participants would be social constructions (Cohen *et al*, 2011). This relativism about the nature of reality is suggestive of a contructionist ontology (Lincoln & Guba, 2000).

Hammersley (2012) has indicated that ontological issues are distinct from, but have implications for, epistemological issues. There are two broad epistemological positions: positivism and interpretivism (Bryman, 2008). Positivism advocates applying methods used in the natural sciences to study the social sciences, with the intention of explaining (rather than interpreting and understanding) human behaviour. This scientific approach to research encompasses the principle of phenomenalism, whereby only phenomena confirmed by the senses can genuinely be warranted as knowledge (Bryman, 2008). A positivist epistemology is generally associated with quantitative methodology (Mackenzie & Knipe, 2006; Teddlie & Tashakkori, 2009) which entails testing a hypothesis to provide an explanation (Bryman, 2008; Teddlie & Tashakkori, 2009). Interpretivism is a contrasting epistemological position to positivism that considers the social sciences to be fundamentally different from the natural sciences, thus requiring different research methods to interpret and understand (rather than explain) the subjective meaning of human behaviour (Bryman, 2008). Qualitative methods are generally used, with an inductive approach to the generation of theory from observations and findings (Bryman, 2008). This process of interpretive understanding has its roots in the *Verstehen* tradition of the late 19th and early 20th centuries (where *Verstehen* means ‘understanding’ in German) (Bryman, 2008; Schwandt, 2000). A postpostivitist methodological approach has a positivist epistemological position (Costley *et al*, 2010). This study took a positivist epistemological position to explain the CPD activities that pharmacists in Northern

Ireland undertook, and the implications this had for the professional practices they engaged in.

Pharmacists in Northern Ireland work in a healthcare setting where a postpositive methodological approach and quantitative research are the norm (Creswell, 1998; Pope & Mays, 2006). Thus, the participants in this study would be familiar with this approach. Quantitative research entails the measurement of concepts and the generation of numerical data (Bryman, 2008; Teddlie & Tashakkori, 2009). This measurement involves conducting experiments or surveys (Gorard, 2001). Although the experiment is considered to be "the 'flagship' or gold standard" of quantitative methodological approaches, the use of the survey is more widespread in educational research (Gorard, 2001, p. 133); especially the cross-sectional survey which produces a snapshot of a population at a particular point in time (Cohen *et al*, 2011).

4.4 Methods

Methods are the tools and instruments used for collecting data (Mackenzie & Knipe, 2006). The choice of methods tends to be influenced by the methodological approach, and thus the research paradigm (Mackenzie & Knipe, 2006). As discussed above, this study had a postpositive methodological approach, and therefore a cross-sectional survey was used. The most popular instrument for collecting survey data is the questionnaire (Cohen *et al*, 2011). There are a number of different ways in which a questionnaire can be administered, including face-to face, telephone, and self-administered (paper-based and online) (Gorard 2001; Cohen *et al*, 2011). Time and travel costs can make face-to face administration of questionnaires an expensive option (Gorard, 2001). Administration by telephone can be cheaper, but neither method is anonymous, and this can have an adverse effect on the responses given by the participants (Gorard, 2001; Cohen *et al*, 2011). A self-administered questionnaire without the presence of the researcher is the most common method of delivery, and has the advantage of participant anonymity (Gorard, 2001). In addition, a large number of people, scattered over a wide geographical area, can be reached (Cohen *et al*, 2011). Paper-based surveys can often incur postal costs, which can be avoided by using online surveys. Since all pharmacists in Northern Ireland are required to use an online system to record their CPD activities, an online survey was considered to be an appropriate method to use in this study. An additional advantage of online over paper-

based surveys is the possibility of making it a requirement that a question is answered before the respondent can progress onto subsequent questions, which can reduce missing data (Bourque & Fielder, 2003).

There is disagreement regarding the response rates that can be achieved using online surveys. Bryman (2008) believes that online surveys typically generate lower response rates than postal questionnaire surveys. Bourque and Fielder (2003) concur, suggesting that response rates of 5% to 70% are routinely observed in online surveys. Gorard (2001) disagrees however, quoting response rates of between 50% and 90% for online surveys sent by email, compared to between 20% and 50% for conventional mail surveys. Nonetheless, response rates with both methods can be improved by following up non-responders (Bourque & Fielder, 2003). In this study, an online questionnaire was emailed to all qualified pharmacists in Northern Ireland who were both registered with the Pharmaceutical Society of Northern Ireland (PSNI) and had registered their email address on the Northern Ireland Centre for Pharmacy Learning and Development (NICPLD) database on 22 May 2015 (n = 2201). Registering their email address on the NICPLD database enables pharmacists to access a variety of learning resources to support their CPD. Two follow-up reminder emails were sent to pharmacists to maximise the response rate. All pharmacists who submitted a completed questionnaire were included in the study. Data analysis took place in Queen's University Belfast using password protected university computers. I was the only person undertaking the data analysis.

4.5 Construction of the questionnaire

The questionnaire was divided into three sections. Section A included demographic questions about the pharmacist's gender, age, year of registration and the sector in which they worked. Section B asked about the learning and development activities they had undertaken, and Section C asked about the professional activities they currently engaged in. Further details about the questions used in the questionnaire can be found in sections 4.5.1, 4.5.2 and 4.5.3. In an attempt to address internal validity and reliability, the questionnaire questions used in this study were adapted from those used by other researchers where possible.

4.5.1 Pharmacy professional practice questions

A number of earlier studies have categorised the professional practices that pharmacists engage in. In their work sampling study, Bell *et al* (1999) developed a classification system to define all activities which could potentially be performed by a community pharmacist in the course of a normal working day. Their classification system was based on those used in previous pharmacy work sampling studies, and fifteen types of activity were identified. McCann *et al* (2010) repeated the study ten years later in the same setting. In the repeat study, Bell *et al's* (1999) classification system was "reviewed by an experienced community pharmacist and adapted slightly to reflect current practice" (McCann *et al*, 2010, p. 537). Davies *et al* (2014) included three additional types of activity in their classification system relating to the advanced and enhanced services that had been introduced in the intervening five years (Department of Health, 2013). The activities used in the above studies were reviewed and adapted for this study to reflect current pharmacy practice in all workplace sectors. Since Davies *et al* (2014) conducted their study, medicines reconciliation, which involves taking a medication history from a patient to obtain an accurate list of their current medicines, has been highlighted as a key priority in the provision of safe and effective patient care (Shah & Barnett, 2015), and was thus included as an additional activity in this study. The focus in this study was on professional activities only. Therefore, the non-professional activities relating to administrative and domestic tasks and rest breaks that were included in previous studies were omitted. Pharmacists were asked to provide information about the activities they routinely engaged in every week. They were asked initially about the main activity they did most frequently and / or spent most of their time doing. This was because the focus of the previous pharmacy work sampling studies was on the activities that pharmacists spent most of their time doing (Bell *et al*, 1999; McCann *et al*, 2010; Davies *et al*, 2014). However, these previous studies also showed that pharmacists do not spend all their time doing just one professional activity; they undertake a number of different activities in a typical week (Bell *et al*, 1999; McCann *et al*, 2010; Davies *et al*, 2014). Therefore, in the questionnaire in this study, pharmacists were asked about all their professional practices, not just their main one, and could include up to a maximum of five activities in total. They were given a list of twelve professional activities to choose from, and could type in any additional activities that were not on the list. For each professional activity they selected, they were asked to give the approximate year they started doing

the activity, and their views about doing it. The questionnaire questions relating to professional activities can be found in Appendix 1.

4.5.2 CPD activity questions

This section included questions about the learning and development activities that participants had undertaken since they registered as a pharmacist. They were asked to provide information about any unstructured, semi-structured and structured learning and development activities they had undertaken. Unstructured learning included informal on-the-job learning, live workshops and/or roadshows and short distance learning courses. Semi-structured learning included short accredited courses that are a pre-requisite to service delivery. To speed up completion of the questionnaire, these courses were listed as options for the pharmacist to select. Structured learning included traditional continuing education (CE) courses, structured work-based learning (WBL) programmes, standalone non-medical prescribing (NMP) courses, and doctorate programmes. Again, the courses that are commonly undertaken by pharmacists in Northern Ireland were entered as options for them to select. The facility to type in details of any other courses and activities they had undertaken was also included. For each learning and development activity they selected, pharmacists were asked to give their reasons for doing that activity, and their views about doing it. Questions were derived from previous studies and the educational literature (Power *et al*, 2011; Donyai *et al*, 2011; Houle, 1980; Cross, 1981). The questionnaire questions relating to CPD activities can be found in Appendix 2.

4.5.3 Pharmacists' attitudes questions

Pharmacists were asked about their attitudes towards CPD, pharmacy practice and their working environment. Questions relating to CPD considered their motivation to learn, and their preferences regarding learning activities. Several different measures have been used to assess an individual's motivation to learn, including the Academic Motivation Scale (Vallerand *et al*, 1992), the Situational Motivation Scale (Guay *et al*, 2000) and achievement goal orientation (Archer, 1994). All of these measures consider forms of intrinsic motivation (pursuing an activity for pleasure or satisfaction), extrinsic motivation (pursuing an activity out of a sense of obligation) and amotivation (the absence of drive to pursue an activity) (Fairchild *et al*, 2005). The Academic Motivation Scale is perhaps the most well known and used of these. However, its

validity as a viable measure of motivation has been questioned, particularly its hypothesis that amotivation, extrinsic motivation and intrinsic motivation fall along a continuum (Fairchild *et al*, 2005). The Situational Motivation Scale looks at similar factors, and proposes a four-factor hierarchical model of motivation (Guay *et al*, 2000). More recently, Deemer *et al* (2010, p. 300) have proposed that the four-factor hierarchical model is "a slightly weaker alternative" to their three-factor model comprising Intrinsic Reward, Failure Avoidance and Extrinsic Reward. Achievement goal orientation is considered to be a more contemporary approach (Fairchild *et al*, 2005), and has been used to study achievement motivation in the healthcare professions, including the pharmacy profession (Perrot *et al*, 2001). Since there is no single tool that has been validated to measure motivation to learn reliably, a combination of factors from these scales was used to explore individual motivation in this study. Questions relating to their preferred learning activities were derived from previous studies and the educational literature (Houle, 1980; Cross, 1981; Donyai *et al*, 2011). For pharmacy practice, individuals were asked for their views on the roles of pharmacists and pharmacy technicians. Questions were based on themes identified in a previous study regarding the potential future roles of pharmacy staff (Braund *et al*, 2012). For their working environment, pharmacists were asked questions relating to expansive and restrictive environments (Fuller & Unwin, 2004a). The questionnaire questions relating to pharmacists' attitudes can be found in Appendix 3.

4.6 Pilot study

A pilot study was carried out to ascertain the suitability of the questionnaire. Five pharmacists who were also members of the NICPLD team agreed to pilot the questionnaire. As recommended by Bourque and Fielder (2003), in an attempt to reduce missing data, the online questionnaire had been constructed so that some questions required an answer before the respondent could progress onto subsequent questions. However, pharmacists in the pilot identified a problem with this facility and found that, for some questions, they were unable to progress as planned. This facility was subsequently removed, meaning that participants were able to skip questions if they wished to do so. Although this improved the functionality of the online questionnaire, it removed the advantage it would have had over a paper-based questionnaire with regard to missing data (Bourque & Fielder, 2003).

4.7 Reflexivity

Cohen *et al* (2011) have argued that reflexivity needs to be addressed in postpostivitist research. In a postpositivist approach, the value systems of the researcher are thought to play an important role in how they conduct their research and interpret their data (Teddlie & Tashakkori, 2009). Reflexivity entails the researcher taking account of their relationships with participants and the situations they are investigating when planning their methodology and evaluating their findings (Bryman, 2008). Cohen *et al* (2011, p. 225) have suggested this means "that researchers should acknowledge and disclose their own selves in the research, seeking to understand their part in, or influence on, the research." I have attempted to do this below.

I am a pharmacist and a member of NICPLD staff in addition to being an EdD student at Queen's University Belfast. At NICPLD, I run structured work-based learning (WBL) programmes for pharmacists. I am also involved in running the non-medical prescribing (NMP) course. For these courses, I would be considered an insider researcher. Trowler (2014) has recognised that, for the insider researcher, there may be conflict between research and professional roles. There is the potential for issues of power differentials between the researcher and researched to occur in either direction, which can be problematic both ethically and methodologically. Insider research can be subjective, and there may be a lack of impartiality and a vested interest in certain results being achieved (Costley *et al*, 2010). A particular ethical dilemma is interview bias whereby participants alter their responses to questions that are being asked by an insider researcher (Trowler, 2014; Mercer, 2007). It is vital that insider bias is given careful attention by the selection of appropriate and reasonable methods (Costley *et al*, 2010). Conversely, for the structured academic (CE) courses provided by Queen's University Belfast and other Higher Education Institutions, I would be considered an outsider researcher. Mercer (2007) has suggested that there is an insider/outsider continuum rather than a dichotomy, and all researchers constantly move back and forth along the continuum. I would also be at the outsider end of the continuum for the semi-structured courses that are a pre-requisite to the delivery of services commissioned by the Department of Health, Social Services and Public Safety (DHSSPS) in Northern Ireland. I would have some involvement in some of the live workshops, roadshows and short distance learning courses (unstructured learning) provided by NICPLD, and would probably be somewhere in the middle of the insider/outsider continuum for these. Due to my complex positionality as a researcher in this study, steps were taken

to fulfil the ethical requirements that are thought to ensure research quality and minimise bias.

4.8 Ethical considerations

Ethicality is a necessary condition for research quality (Groundwater-Smith & Mockler, 2007). For clinical research to be ethical, Emanuel *et al* (2000) have indicated that the following seven ethical requirements must be fulfilled:

1. value (it must aim for improvement)
2. scientific validity (methodology must be rigorous)
3. fair subject selection
4. favourable risk-benefit ratio (risks must be minimised)
5. independent review (for example, by a research ethics committee)
6. informed consent (which must be voluntary)
7. respect for enrolled subjects (privacy must be maintained, they must be given the opportunity to withdraw, and their well-being must be monitored).

These requirements have been encompassed in the key principles of the British Educational Research Association (BERA) Ethical Guidelines for Educational Research (2011) and the Economic and Social Research Council (ESRC) Framework for Research Ethics (FRE) (2015) which are now widely used by research ethics committees, including those in universities, to assess and approve research. Although some are critical of using this model for educational research, believing it to be restrictive (Hodkinson, 2004; St. Pierre, 2006; Boden *et al*, 2007; Penn & Soothill, 2007), others acknowledge the need to govern educational research to provide safeguards for both participants and researchers (Hammersley, 2012). The steps taken in this study to fulfil these ethical requirements and ensure research quality are outlined in sections 4.8.1-7 below.

4.8.1 Value

The study aimed for improvement by trying to address a gap that had been identified in the literature. There is little evidence in the literature to demonstrate that CPD has a positive effect on professionals' practice, and this may due to the complex and multi-factorial nature of both CPD and professional practice. In this study, an appropriate instrument (geometric coding) was sought which could comprehensively assess CPD

and pharmacy professional practice in order to determine the implications of the former for the latter.

4.8.2 Scientific validity

Quantitative data was collected in an attempt to reduce any potential conflicts of interest between my research and professional roles. An online questionnaire was used to provide anonymity for participants, and I paid special attention to the wording of the questionnaire questions to try to make sure that they did not lead participants to answer in a particular way. Questionnaire questions were adapted from those used by other researchers where possible.

4.8.3 Fair subject selection

The online questionnaire was emailed to all pharmacists on the NICPLD database on 22 May 2015 (n = 2201). Thus all qualified pharmacists in Northern Ireland who were both registered with the Pharmaceutical Society of Northern Ireland (PSNI) and had registered their email address on the NICPLD database on that date had the opportunity to participate in the study.

4.8.4 Favourable risk-benefit ratio

Participants were informed that there were no disadvantages or risks associated with participating in the study. Participants were asked to indicate the professional practices they were engaged in from a designated list. Likewise, they were asked to indicate their sector of work using broad categories (community, hospital, primary care, academia, industry and other); the names of individual organisations were not collected. They were not asked for any qualitative information about these areas, and thus the data collected was not critical of working practices or workplace establishments. It was anticipated that there would not be any disclosure of illegal activities through this design. Participants were also informed that there were no immediate benefits to them taking part in the study, but that the results may help to inform the educational approaches that are used to support CPD in the future. This in turn may help to extend pharmacy professional practice and could potentially improve outcomes for patients. No incentives were used.

4.8.5 Independent review

Ethical approval for this study was granted by the Queen's University Belfast School of Education's Research Ethics Committee, which approves educational research in the School of Education. Approval by the Office for Research Ethics Committees Northern Ireland (ORECNI), which approves research involving participants within the Health and Social Care (HSC) system in Northern Ireland, was not required. This was because not all participants were HSC employees, and participants were recruited by virtue of their professional role and not through HSC organisations directly, meaning that ethical approval for the research at University School level was deemed sufficient.

4.8.6 Informed consent

The two main components of informed consent are understanding and voluntariness (Alderson & Goodey, 1998). To ensure understanding, a participant information sheet (Appendix 4) was attached to the emailed online questionnaire. The covering email (Appendix 5) asked pharmacists to read the participant information sheet before deciding whether or not to participate in the study, and to contact me if they had any questions. Both the covering email and the participant information sheet stated that pharmacists were under no obligation to complete the questionnaire. Voluntariness was stressed again in the participant information sheet, which also informed individuals that their decision on whether or not to take part in the study would not impact on their current or future relationship with NICPLD or the PSNI.

4.8.7 Respect for enrolled subjects

In quantitative research, privacy can be achieved by maintaining anonymity (Howe & Moses, 1999). Responses to the online questionnaire in this study were completely anonymous for this reason. Names of individuals or organisations, or any other identifying information, were not collected. All information gathered was kept confidential. Pharmacists were informed that they could withdraw from the study at any time until the online questionnaire had been submitted. However, because all responses were anonymous, once an individual had submitted a questionnaire they were not able to withdraw from the study. Responses from all completed questionnaires that were submitted were included in the study.

4.9 Conclusion

In summary, this study aimed to explain the CPD activities and professional practices that pharmacists engaged in. A postpostivitist methodological approach was used which had a contructionist ontology and a positivist epistemology. A positivist epistemology is generally associated with quantitative methodology, and a cross-sectional survey was used in this study. An online questionnaire was emailed to all qualified pharmacists in Northern Ireland (n = 2201). Questionnaire questions were adapted from those used by other researchers where possible, and a pilot study was carried out to ascertain the suitability of the questionnaire. Due to my complex positionality as a researcher in this study, steps were taken to fulfil the seven ethical requirements that ensure research quality (value, scientific validity, fair subject selection, favourable risk-benefit ratio, independent review, informed consent and respect for enrolled subjects).

CHAPTER 5: RESULTS

5.1 Introduction

SPSS version 21 was used to analyse the data collected in this study, and the findings are presented in this chapter. Section 5.1 summarises the response rate and respondents' demographic data. Section 5.2 considers the CPD activities undertaken by pharmacists in Northern Ireland and the implications it had for their professional practice. Section 5.3 explores the impact that pharmacists' attitudes towards CPD, pharmacy practice and their working environment had on the CPD activities and professional practices they engaged in. Section 5.4 summarises the factors that were found to influence pharmacists' professional practices in this study. The implications of the findings of the study for the educational approaches for pharmacists' CPD will be discussed in more detail in chapter 6.

5.1.1. Response rate

The questionnaire was sent to all 2201 pharmacists who were both registered with the Pharmaceutical Society of Northern Ireland (PSNI) and were on the Northern Ireland Centre for Pharmacy Learning and Development (NICPLD) database on 22 May 2015. After two follow-ups there were 419 respondents, giving a response rate of 19%. This is towards the lower end of the range of response rates that are routinely observed in online surveys (Bourque & Fielder, 2003).

5.1.2. Demographics

Pharmacists were asked about their gender, age, year of registration and the sector in which they worked. Respondents' demographics were compared with the most recent registrants' statistics available from the PSNI (from 2014). The percentage of male and female respondents closely reflected the gender profile of PSNI registrants. The age range of respondents was slightly higher than that of PSNI registrants. The PSNI does not publish information on time since registering as a pharmacist. 374 of the 419 respondents specified their main sector of work. The percentage of community pharmacy respondents was slightly lower than that of PSNI registrants, and the percentage of hospital pharmacy respondents was higher. Demographic data is summarised in table 5.1.

Table 5.1. Demographic data of respondents and PSNI registrants

	No. of respondents	% respondents	PSNI %
Gender:			
Female	303	72.3%	72%
Male	116	27.7%	28%
Total	419	100%	100%
Age range (years)			
18 to 24	23	5.49%	5.94%
25 to 34	131	31.26%	47.45%
35 to 44	137	32.70%	25.77%
45 to 54	94	22.43%	15.28%
55 to 64	29	6.92%	4.94%
65 to 74	4	0.95%	0.61%
75 or older	1	0.24%	
Total	419	100%	100%
Time since registering as a pharmacist (years):			
0 to <2	42	10.0%	N/A
2 to <5	38	9.1%	N/A
5 to <10	68	16.2%	N/A
10 or <20	125	29.8%	N/A
20 to <30	105	25.1%	N/A
30 or more	41	9.8%	N/A
Total	419	100%	N/A
Main sector of work:			
Community	182	48.66%	59%
Hospital	136	36.36%	22%
Primary care	20	5.35%	4%
Academia	17	4.55%	3%
Industry	2	0.53%	2%
Other	17	4.55%	10%
Total	374	100%	100%

5.2 Are pharmacists' professional practices influenced by the CPD activities they engage in?

This section focuses on whether pharmacists' professional practices were influenced by the CPD activities they engaged in. Section 5.2.1 looks at the professional practices that pharmacists engaged in. Professional activities were categorised initially, then pharmacists' main professional activity (that is, the one they spent most of their time doing), and also all their professional activities (up to a maximum of five in total) were considered. Section 5.2.2 then looks at the different CPD activities the pharmacists had undertaken. Unstructured, semi-structured and structured learning, and the educational approach, were used to categorise the CPD activities. Section 5.2.3 goes on to consider the influence of pharmacists' CPD activities on the professional activities they engaged in. It considers the influence on both their main professional activity, and all their professional activities, with a particular focus on the impact it had on their engagement in extended patient care activities.

5.2.1 Pharmacy professional practices

The twelve professional activities included in this study were categorised using a classification system based on previous pharmacy work sampling studies (Bell *et al*, 1999; McCann *et al*, 2010; Davies *et al*, 2014). These previous studies had grouped the different types of activity into three categories: professional, semi-professional and non-professional activities. Professional activities were those that could only be undertaken by a pharmacist; semi-professional activities could be performed by other members of the pharmacy team (pharmacy technicians and dispensing/pharmacy assistants in addition to pharmacists); non-professional activities included administrative and domestic tasks as well as rest breaks. As discussed in section 4.5.1, non-professional activities were omitted in this study, although an 'other' category was added for any miscellaneous activities that respondents wanted to include.

Interestingly, although Davies *et al* (2014) included three additional types of activity in their study relating to the advanced and enhanced services that had been introduced in the intervening years since the studies by Bell *et al* (1999) and McCann *et al* (2010) were conducted, they still classified the activities into three categories (professional, semi-professional and non-professional), and did not differentiate between advanced /

enhanced and essential professional activities. As the focus in this study was on pharmacists' engagement in extended patient care activities, it was decided to differentiate advanced / enhanced services from essential services. Professional activities were sub-divided into essential services that must be carried out by a pharmacist (Professional-pharmacist) and extended patient care services that must be carried out by a pharmacist (Extended-professional-pharmacist).

The earlier studies classified education and training of staff as a professional activity. However, although this is an advanced role that would be carried out by a senior member of staff, it is not a pharmacy-specific professional activity. Likewise, leading and managing activities and research activities would be advanced roles that are not pharmacy-specific. Therefore, another category, advanced services carried out by a senior member of staff (not pharmacy-specific) (Advanced-service) was added.

As mentioned in section 4.5.1, since Davies *et al* (2014) conducted their study, medicines reconciliation has been highlighted as a key priority in the provision of safe and effective patient care (Shah & Barnett, 2015), and was thus included as a professional activity in this study. Medicines reconciliation involves taking a medication history from a patient to obtain an accurate list of their current medicines, and should be "carried out by a trained and competent health professional – ideally a pharmacist, pharmacy technician, nurse or doctor" (Shah & Barnett, 2015, p. 23). Training programmes have been running across the UK (including Northern Ireland) for a number of years to train and accredit pharmacy technicians to undertake this role (Fenn, 2016). Indeed, Scullin *et al* (2012) have recommended using accredited pharmacy technicians routinely to carry out medicines reconciliation when patients are admitted to hospital. Training programmes have also been running for even longer to train and accredit pharmacy technicians to accuracy check dispensed medicines (Fenn, 2016). Accuracy checking was classified as a professional activity in the earlier studies. However, it was decided to add in a category in this study for these professional activities that can be carried out by a trained and accredited pharmacy technician (Professional-technician).

The twelve professional activities included in this study were classified into six categories as outlined in table 5.2.

Table 5.2. Categorisation of professional activities

Category	Professional activity
Semi-professional (can be carried out by any member of pharmacy staff)	Dispensing and/or preparing medicines and/or products
	Purchasing and/or procuring medicines and/or products
Professional-technician (can be carried out by a trained and accredited pharmacy technician)	Accuracy checking dispensed and/ or prepared medicines and/or products
	Taking medication histories from patients to obtain an accurate list of their medicines
Professional-pharmacist (essential service that must be carried out by a pharmacist)	Clinically checking prescriptions for appropriateness for individual patients
	Providing medicines information and/or pharmaceutical advice
Extended-professional-pharmacist (extended patient care service that must be carried out by a pharmacist)	Reviewing individual patients and optimising their medicines / MUR
	Prescribing medicines as a qualified Pharmacist Prescriber
	Health promotion and prevention
Advanced-service (carried out by a senior member of staff (not pharmacy-specific))	Leading & managing a team and/or service
	Educating & training staff and/or trainees
	Research and/or service development
Other	Miscellaneous non-professional activities

Pharmacists were asked if, in a typical week, they routinely engaged in pharmacy professional activities. 300 pharmacists (= 71.6% of the 419 respondents) answered this question. 249 (83.0%) said yes, and 51 (17.0%) said no. The 249 respondents who said yes were asked to give their main professional activity; that is, the one that they spent most of their time doing. The results are summarised in table 5.3.

Table 5.3. Summary of main professional activities by category (N = 249)

Main professional activity	Frequency	%
Semi-professional	45	18.1%
Professional-technician	82	32.9%
Professional-pharmacist	43	17.3%
Extended-professional-pharmacist	22	8.8%
Advanced-service	46	18.5%
Other	11	4.4%
Total	249	100%

The most frequently undertaken main professional activities in this study, which were done by approximately one third of respondents (32.9%, n = 82), were those classified as Professional-technician. These activities included accuracy checking dispensed medicines, and taking medication histories from patients to obtain an accurate list of their medicines. Both of these activities would have been categorised as Professional-pharmacist activities in the previous studies by Bell *et al* (1999), McCann *et al* (2010) and Davies *et al* (2014). However, they can be done by appropriately trained and accredited pharmacy technicians, and hence were categorised as such in this study. Approximately 18% of respondents (n = 45) said their main activities were Semi-professional. These activities can be undertaken by any member of the pharmacy team (pharmacist, pharmacy technician and pharmacy assistant) and include dispensing medicines and purchasing medicinal products. Thus a different picture was obtained in this study compared to the previous studies by Bell *et al* (1999), McCann *et al* (2010) and Davies *et al* (2014). However, it must be pointed out that a different methodology was used in this study, and it is not known how much time was spent undertaking each activity. In addition, all pharmacists were included in this study, not just those working in the community sector. Nevertheless, 51% of pharmacists engaged in practices that did not need to be undertaken by a pharmacist as their main professional activity. A similar proportion of respondents in this study (18.5% (n = 46) and 17% (n = 43) respectively) undertook Advanced-service and Professional-pharmacist activities. The former encompass research, education and leadership activities that are performed by a senior member of staff but are not pharmacy-specific; the latter are essential services that must be performed by a pharmacist and include clinical checking and providing pharmaceutical advice. A similarity with the previous studies was the low number of pharmacists undertaking extended patient care activities. Only approximately 9% of respondents (n = 22) said they undertook Extended-professional-pharmacist activities (reviewing and optimising patients' medicines, prescribing medicines and health promotion and prevention) as their main professional activity.

Respondents were given five statements about their main professional activity, and were asked to indicate their degree of agreement or disagreement on a five-point Likert scale (Bryman & Cramer, 2011). Although this is an ordinal scale, Bryman and Cramer (2011) have proposed that it is now common practice in social sciences research to

treat it as though it were an interval scale. This pragmatic approach is based on the assumption that the amount of error that can occur is minimal in relation to the advantages that can be gained by applying parametric tests to analyse the data generated (Bryman & Cramer, 2011). However, the validity of this assumption has been queried in medical sciences research (Jamieson, 2004) and remains controversial (Bryman & Cramer, 2011). Nevertheless, the pragmatic approach has become the norm in social sciences research, and one-way ANOVA tests are routinely conducted with Likert scale data if the variables have reasonably normal distributions (Blaikie, 2003). SPSS provides a measure of skewness to ascertain whether variables are normally distributed (Bryman & Cramer, 2011). A value around zero indicates no skew and a normal distribution; negative values suggest the data are negatively skewed, and positive values that the data are positively skewed (Bryman & Cramer, 2011). As a general rule of thumb, if the absolute value of the skew is below two, this is generally regarded as acceptable (Acton *et al*, 2009). The SPSS measure of skewness values for the five variables (views about main professional activities) are given in table 5.4.

Table 5.4. Views about main professional activities and SPSS measure of skewness

View about main professional activity	**SPSS measure of skewness**
I feel confident doing this activity (N = 247)	-1.022
I enjoy doing this activity (N = 245)	-0.978
Doing this activity is an effective use of my professional knowledge and skills (N = 245)	-0.772
It would be more appropriate for a pharmacy technician to do this activity (N = 245)	0.593
It would be more appropriate for a doctor to do this activity (N = 246)	1.051

As the absolute values of the skew were below two for all five variables, parametric tests were applied. One-way ANOVA tests revealed no significant difference in the mean scores relating to how confident pharmacists felt about doing their main professional activity. Respondents felt confident doing all categories of activity (mean scores > 4 = agree or strongly agree). However, significant differences were found for

the remaining four statements. The mean scores and significance levels for all five statements are given in table 5.5.

Table 5.5. Views about main professional activities by category

View about activity	Main professional activity	Mean	SD	Sig level
I feel confident doing this activity (N = 247)	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	4.3778 4.4875 4.2791 4.5909 4.3261 4.0909	0.53466 0.59521 0.76612 0.50324 0.59831 0.70065	.121
I enjoy doing this activity (N = 245)	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	3.6364 3.6000 4.1628 4.5909 4.3556 4.0909	0.96668 1.01383 0.87097 0.50324 0.64511 0.83121	.000
Doing this activity is an effective use of my professional knowledge and skills (N = 245)	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	3.4889 3.4750 4.2558 4.7143 4.3333 4.0909	0.99138 1.03085 0.90219 0.46291 0.70711 0.83121	.000
It would be more appropriate for a pharmacy technician to do this activity (N = 245)	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	2.8222 2.8125 1.6977 1.4091 1.4318 1.6364	1.05073 1.13733 0.88734 0.66613 0.58658 0.80904	.000
It would be more appropriate for a doctor to do this activity (N = 246)	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	1.5556 1.5750 1.6977 2.1364 1.4222 1.6364	0.58603 0.70755 0.83195 0.77432 0.62118 0.67420	.006

For the four statements where significant differences were found, post-hoc comparisons were conducted using the Scheffé test (Bryman & Cramer, 2011; Pallant, 2013). Full details can be found in Appendices 6, 7, 8 and 9. For three of the statements ('I enjoy doing this activity', 'Doing this activity is an effective use of my professional knowledge and skills' and 'It would be more appropriate for a pharmacy technician to do this activity') differences were found between Semi-professional activities and Professional-pharmacist, Extended-professional-pharmacist and Advanced-service activities, and also between Professional-technician activities and Professional-pharmacist, Extended-professional-pharmacist and Advanced-service activities. Semi-professional and Professional-technician activities (which 51% of

respondents said they spent most of their time doing) were considered to be less enjoyable and a less effective use of professional knowledge and skills than Professional-pharmacist, Extended-professional-pharmacist and Advanced-service activities. Semi-professional and Professional-technician activities were also considered more appropriate for a pharmacy technician to do; however mean scores of < 4 for all categories of activity indicate no real agreement with this statement. For the statement 'It would be more appropriate for a doctor to do this activity' the only difference found was between Extended-professional-pharmacist and Advanced-service activities. The former were considered more appropriate for a doctor to do than the latter, but again the mean scores were < 4 for all categories of activity indicating no real agreement with this statement.

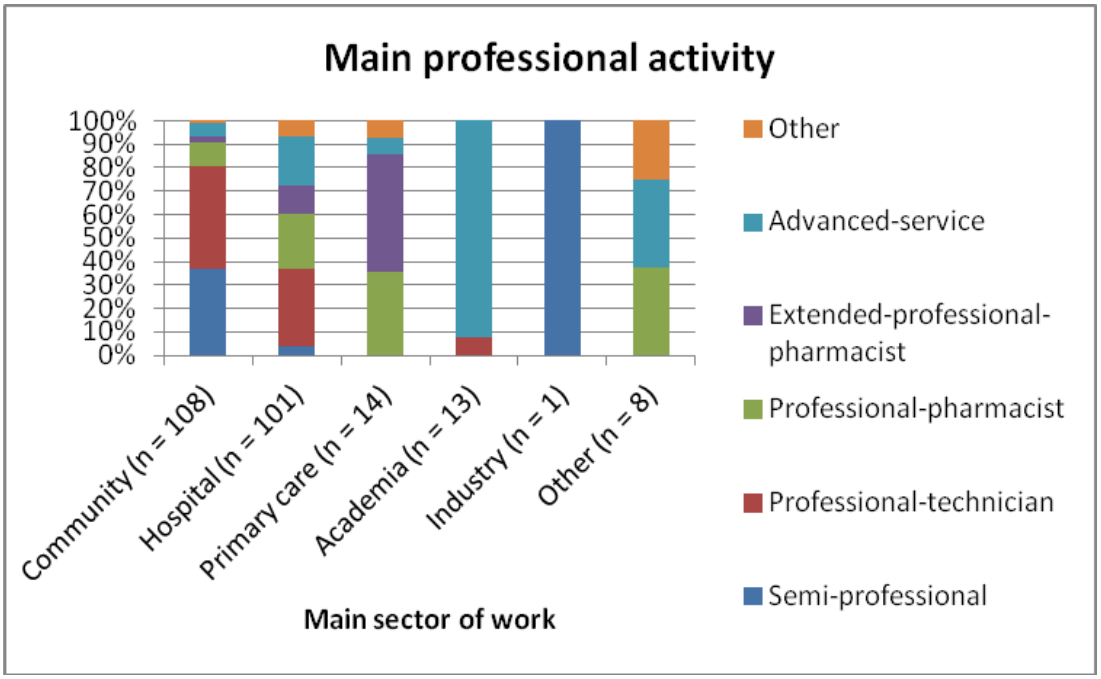
Using a Chi square test, no association was found between a pharmacist's main professional activity and their gender or age. However, an association was found between a pharmacist's main professional activity and their main sector of work ($p < .001$, Chi-Square = 168.367, df = 25). 245 of the 249 respondents specified their main sector of work. The results are displayed in table 5.6.

Table 5.6. Main professional activities by main sector of work (N = 245)

	Community	Hospital	Primary care	Academia	Industry	Other	TOTAL
Semi-professional	40	4	0	0	1	0	45
Professional-technician	47	33	0	1	0	0	81
Professional-pharmacist	11	24	5	0	0	3	43
Extended-professional-pharmacist	3	12	7	0	0	0	22
Advanced-service	6	21	1	12	0	3	43
Other	1	7	1	0	0	2	11
TOTAL	108	101	14	13	1	8	245

These results are illustrated in Figure 5.1, which indicates very different profiles for the main professional activities that were undertaken in each sector of work.

Figure 5.1. Main professional activities by main sector of work (N = 245)



In the community sector, the most frequently undertaken main professional activities were Professional-technician (n = 47 (43%)). However, only slightly fewer respondents (n = 40 (37%)) said that their main activities were Semi-professional. These proportions were higher than for all the other sectors of work, and were the most similar to those seen in the previous studies. This meant that 80% of community respondents spent most of their time doing activities which did not need to be undertaken by a pharmacist; activities which achieved the lowest scores for enjoyment and effective use of their professional knowledge and skills. This is much higher than the overall figure of 51% that was obtained for all respondents. The main activities for 10% of community pharmacist respondents (n = 11) were Professional-pharmacist, with only 3% (n = 3) spending most of their time doing Extended-professional-pharmacist activities and 6% (n = 6) providing an Advanced-service. In the hospital sector there was a more even spread of activities. The most frequently undertaken main professional activities were still Professional-technician (n = 33 (33%)), but only 4% (n = 4) said their main activities were Semi-professional, which is considerably lower than the overall figure of 18%. 24% (n = 24) of hospital pharmacist respondents' main activities were Professional-pharmacist, 21% (n = 21) were an Advanced-service, and 12% (n = 12) were Extended-professional-pharmacist. The number of respondents working in primary care and academia was considerably smaller than the number working in the community and hospital sectors. In primary care, no respondents

specified that their main activities were Professional-technician or Semi-professional. Indeed, the majority (n = 7 (50%)) indicated that their main activities were Extended-professional-pharmacist, with 36% (n = 5) giving Professional-pharmacist and only 7% (n = 1) giving Advanced-service as their main activities. Conversely, in academia the majority of respondents (n = 12 (92%)) undertook Advanced-service activities such as research and education as their main professional activities. Only one respondent worked in industry and specified a main professional activity. They did Semi-professional activities, whilst the eight respondents working in other sectors did Advanced-service, Professional-pharmacist and other (miscellaneous) activities.

Previous pharmacy work sampling studies have shown that pharmacists do not spend all their time doing just one professional activity; they undertake a number of different activities in a typical week (Bell *et al*, 1999; McCann *et al*, 2010; Davies *et al*, 2014). Therefore, in the questionnaire, pharmacists were asked about all their professional practices (up to a maximum of five in total), not just their main one. The 249 respondents gave a total of 749 professional activities that, in a typical week, they routinely engaged in. The results are summarised in table 5.7.

Table 5.7. Summary of all professional activities by category (N = 749 responses from 249 respondents)

All professional activities	Frequency	%
Semi-professional	127	17.0%
Professional-technician	168	22.4%
Professional-pharmacist	208	27.8%
Extended-professional-pharmacist	118	15.8%
Advanced-service	101	13.5%
Other	27	3.6%
Total	749	100%

Approximately 28% (n = 208) of the activities were Professional-pharmacist, and approximately 22% (n = 168) were Professional-technician. A lower proportion of the activities were Semi-professional (n = 127 (17%)), which differs from the picture seen in the previous studies. A similar proportion of activities were Extended-professional-

pharmacist (n = 118 (approximately 16%)). Although not directly comparable, this level of engagement with extended patient care activities does reflect the picture seen in the previous studies. 13.5% (n = 101) were Advanced-service activities, and 3.6% (n = 27) were categorised as other.

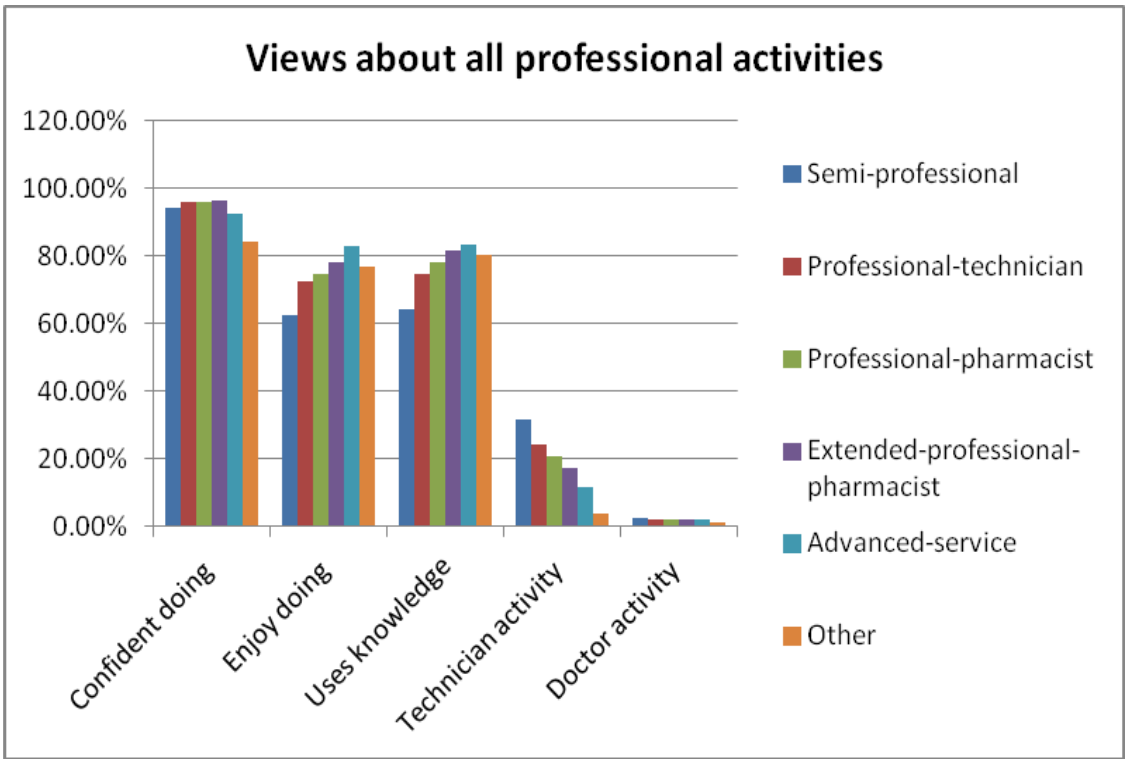
Respondents were asked for their views about all their professional activities. They were given the same five statements as earlier and were asked to indicate their degree of agreement or disagreement on a five-point Likert scale (Bryman & Cramer, 2011). Again, a score of 4 or more (agree or strongly agree) was taken to indicate agreement with the statement. These 749 professional activities are a "multiple response set" (Acton *et al*, 2009, p. 161). A feature of multiple response sets is that the number of responses that each respondent contributes to the set can vary (Acton *et al*, 2009). In this case, the minimum number of possible responses that a respondent could give was one and the maximum was five, meaning that the minimum number of responses for this particular multiple response set was 249 (if all 249 respondents gave one response) and the maximum number was 1245 (if all 249 respondents gave five responses). However, the unpredictable nature of the number of responses given by each respondent means that multiple response sets are not amenable to confirmatory statistical analysis (Acton *et al*, 2009). This is because generalisation from a multiple response set to a whole population (which is the basic premise of probability-based statistical testing) is unreliable (Acton *et al*, 2009). The multiple response procedure is a useful tool for data exploration, and this is done by comparing percentages (Acton *et al*, 2009). The percentage agreement with each statement for each category of professional activity is given in table 5.8, and illustrated in Figure 5.2.

Table 5.8. Views about all professional activities by category (N = 749 responses from 249 respondents)

View about professional activity	Category of professional activity	% agree or strongly agree
I feel confident doing this activity	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	93.95% 95.73% 95.75% 96.51% 92.45% 84.15%
I enjoy doing this activity	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	62.39% 72.63% 74.71% 78.12% 82.97% 76.83%
Doing this activity is an effective use of my professional knowledge and skills	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	64.04% 74.52% 77.98% 81.64% 83.17% 80.25%
It would be more appropriate for a pharmacy technician to do this activity	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	31.82% 24.05% 20.96% 17.25% 11.78% 3.66%
It would be more appropriate for a doctor to do this activity	Semi-professional Professional-technician Professional-pharmacist Extended-professional-pharmacist Advanced-service Other	2.60% 2.06% 2.32% 2.18% 2.20% 1.22%

There was a high level of agreement with the statement 'I feel confident doing this activity' for all categories of professional activity. Advanced-services followed by Extended-professional-pharmacist activities achieved the highest scores for enjoyment and effective use of professional knowledge and skills. There was some agreement that it would be more appropriate for a pharmacy technician to do some of the activities, in particular those categorised as Semi-professional and Professional-technician. There was no agreement that it would be more appropriate for a doctor to do any of the activities.

Figure 5.2. Views about all professional activities by category (N = 749 responses from 249 respondents)



Acton *et al* (2009, p. 177) recommend using "geometric coding" to convert multiple response data into categorical variables that are amenable to confirmatory statistical analysis. Geometric coding is an algebraic method which is employed in a mathematical context (Stichtenoth, 1990). A "geometric progression" is used whereby each categorical variable is assigned a numerical value which is a doubling of the previous value (Acton *et al*, 2009, p. 177). Acton *et al* (2009) have indicated that geometric coding is a method that can be used in social science studies to create categorical variables made up of the multiple combinations of responses given by individual respondents. Nevertheless, it does not appear to be a method that is widely used in the social science context. Although not widely used in other non-mathematical contexts either, geometric coding has been used in the healthcare context to assess the impact of different interventions on the management of patients with diabetes (Rascón-Pacheco *et al*, 2010). Diabetes is a complex long-term condition requiring multiple complex interventions to manage the disease and to prevent its many associated complications (Mol, 2009). The Medical Research Council (2000) has recognised that complex interventions in healthcare comprise a number of

independent and interdependent components. This can include the input of different healthcare professionals, the treatments used, the timeliness of administering those treatments, and the technologies available; and it is difficult to determine the impact of individual interventions (Medical Research Council, 2000). Rascón-Pacheco *et al* (2010) found geometric coding to be an ideal instrument for comprehensively assessing the level of control in patients with diabetes. They suggested that this comprehensive assessment would enable the input of resources, materials and healthcare professionals to the care of patients with this complex long-term condition to be optimised (Rascón-Pacheco *et al*, 2010). Interestingly, Fenwick (2014) has compared the complex and multi-factorial nature of learning and practice in the medical profession to the management of patients with diabetes. For this reason, it was felt that geometric coding could also be an appropriate instrument for comprehensively assessing learning and practice in this study.

To enable geometric coding, the five professional activity categories were assigned the following values (each category was assigned a numerical value which was a doubling of the previous value in a geometric progression):

1 = Semi-professional

2 = Professional-technician

4 = Professional-pharmacist

8 = Extended-professional-pharmacist

16 = Advanced-service

Other (miscellaneous non-professional) activities were not included in the analysis, and were assigned a value of 0.

These values were then used to create the 'type of professional activity' geocodes incorporating all 749 professional activities that the 249 respondents undertook. With five categories, there were 31 possible combinations (Rascón-Pacheco *et al*, 2010). All 31 combinations were seen, and were grouped together into the following six geocode clusters (Acton *et al*, 2009):

1. Geo-Semi-professional = Semi-professional activities only *(geocode = 1)*
2. Geo-Professional-technician = Professional-technician +/- Semi-professional activities *(geocodes = 2 and 3)*

3. Geo-Professional-pharmacist = Professional-pharmacist +/- Professional-technician +/- Semi-professional activities *(geocodes = 4 - 7)*
4. Geo-Extended-professional-pharmacist = Extended-professional-pharmacist +/- Professional-pharmacist +/- Professional-technician +/- Semi-professional activities *(geocodes = 8 - 15)*
5. Geo-Advanced-service = Advanced-service +/- Professional-pharmacist +/- Professional-technician +/- Semi-professional activities *(geocodes = 16 - 23)*
6. Geo-Advanced-Extended = Advanced-service + Extended-professional-pharmacist +/- Professional-pharmacist +/- Professional-technician +/- Semi-professional activities *(geocodes = 24 - 31)*

Seven of the 249 respondents had a geocode of 0 because they said they did 'Other' (non-professional) activities only. This left 242 respondents who were allocated to the six 'type of professional activity' geocode clusters. The results are summarised in table 5.9.

Table 5.9. Summary of respondents by type of professional activity geocode (N = 242)

Type of professional activity geocode	Frequency	%
Geo-Semi-professional	10	4.1%
Geo-Professional-technician	23	9.5%
Geo-Professional-pharmacist	56	23.1%
Geo-Extended-professional-pharmacist	68	28.1%
Geo-Advanced-service	58	24.0%
Geo-Advanced-Extended	27	11.2%
Total	242	100%

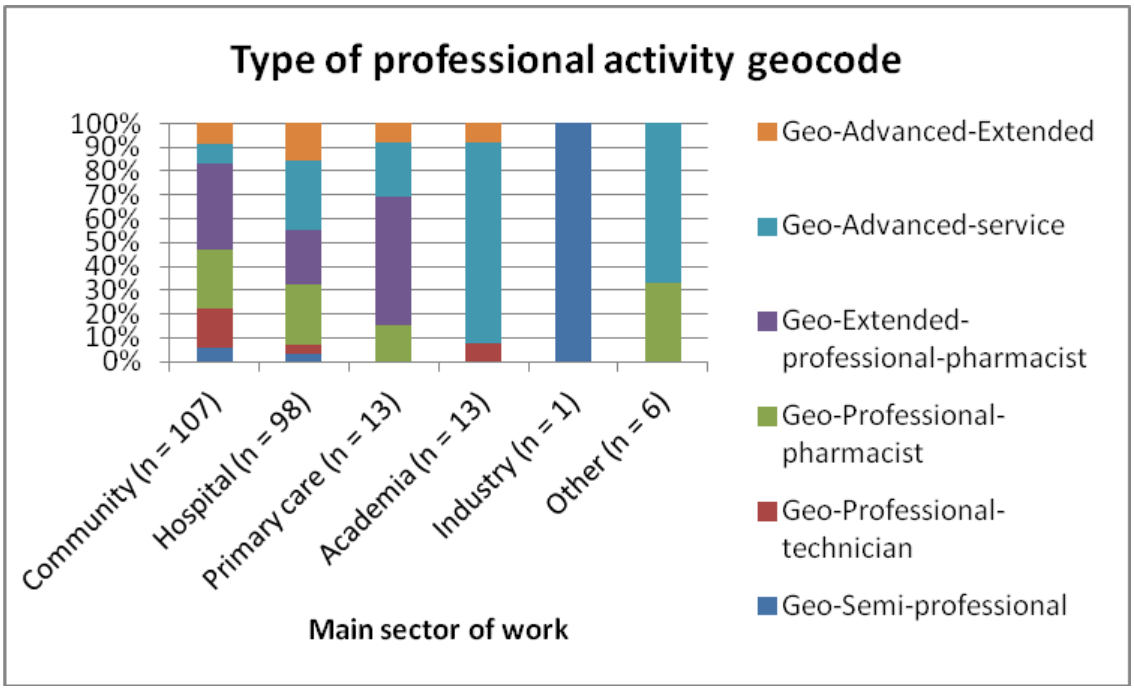
The 'type of professional activity' geocodes that were generated were categorical variables and were amenable to confirmatory statistical analysis (Acton *et al*, 2009). Using a Chi square test, no association was found between a pharmacist's type of professional activity and their gender or age. However, an association was found between a pharmacist's 'type of professional activity' geocode and their main sector of work ($p < .001$, Chi-Square = 92.072, df = 25). 238 of the 242 respondents specified

their main sector of work. The results are given in table 5.10 and illustrated in Figure 5.3.

Table 5.10. 'Type of professional activity' geocode by main sector of work (N = 238)

	Community	Hospital	Primary care	Academia	Industry	Other	TOTAL
Geo-Semi-professional	6	3	0	0	1	0	10
Geo-Professional-technician	18	4	0	1	0	0	23
Geo-Professional-pharmacist	26	25	2	0	0	2	55
Geo-Extended-professional-pharmacist	39	22	7	0	0	0	68
Geo-Advanced-service	9	29	3	11	0	4	56
Geo-Advanced-Extended	9	15	1	1	0	0	26
TOTAL	107	98	13	13	1	6	238

Figure 5.3. 'Type of professional activity' geocode by main sector of work (N = 238)



In the community sector, 24 of the 107 pharmacists (22.4%) engaged only in activities that did not have to be undertaken by a pharmacist (5.6% (n = 6) in Geo-Semi-professional activities and 16.8% (n =18) in Geo-Professional-technician activities). In the hospital sector the proportion was 7% (7 pharmacists; 3 (3%) Geo-Semi-professional and 4 (4%) Geo-Professional-technician activities); whilst in the primary care sector it was 0%. Approximately 25% of pharmacists in both the community and hospital sectors engaged in essential services that must be carried out by a pharmacist (Geo-Professional-pharmacist activities) compared to 15% in primary care. The majority (12) of the 13 pharmacists in academia undertook Advanced-services (1 of these undertook Geo-Advanced-Extended activities) such as research and education, and were thus unlikely to provide direct patient care services. Only one respondent worked in industry and specified their professional activities. They undertook solely Geo-Semi-professional activities, and the 6 pharmacists in other sectors undertook Geo-Professional-pharmacist and Geo-Advanced-Extended activities.

As the focus of this study was on extended practice, the 'type of professional activity' geocodes were further amalgamated into two main geocode clusters: 'some extended practice', or 'no extended practice'. The results are summarised in table 5.11.

Table 5.11. Summary of respondents by amalgamated professional activities geocode cluster (N = 242)

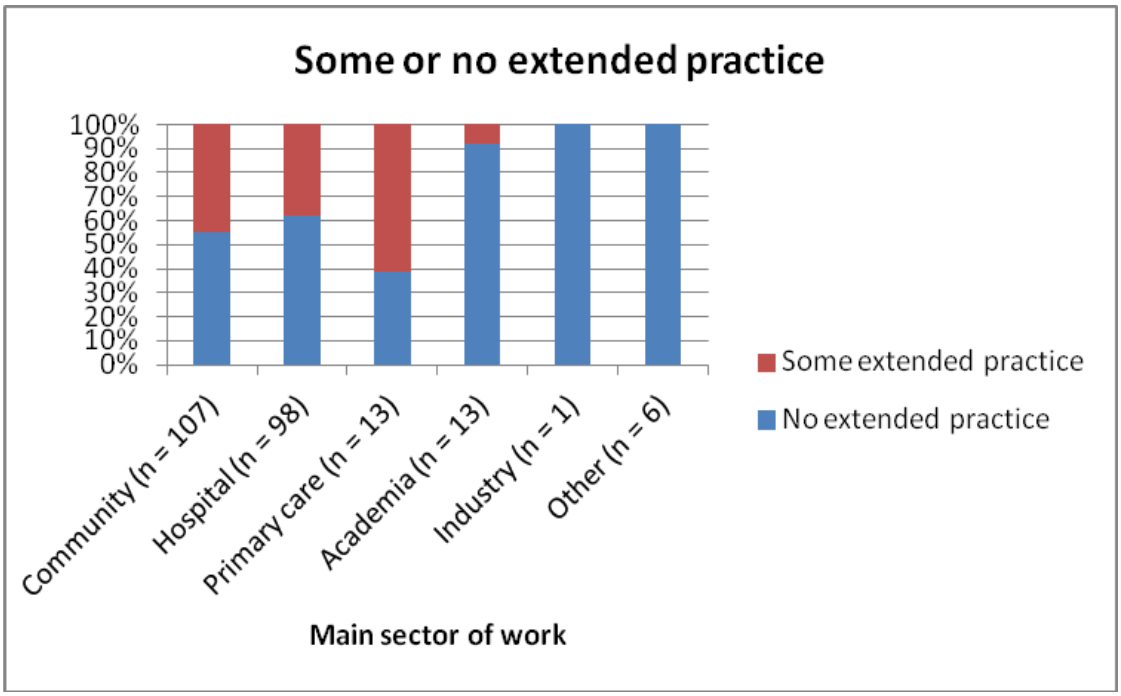
Amalgamated cluster	Type of professional activity geocode	Frequency	%
Some extended practice	Geo-Extended-professional-pharmacist	95	39.3%
	Geo-Advanced- Extended		
No extended practice	Geo-Semi-professional	147	60.7%
	Geo-Professional-technician		
	Geo-Professional-pharmacist		
	Geo-Advanced-service		
Total		242	100%

Almost 40% of the 242 respondents engaged in some extended patient care activities, meaning that just over 60% engaged in no extended patient care activities at all. A Chi square test revealed no association between whether a pharmacist undertook some extended practice and their gender or age, although an association was found between whether a pharmacist undertook some extended practice and their main sector of work ($p = .015$, Chi-Square = 14.128, df = 5). 238 of the 242 respondents specified their main sector of work. The results are given in table 5.12 and illustrated in Figure 5.4.

Table 5.12. Amalgamated professional activities geocode ('some or no extended practice') by main sector of work (N = 238)

	Community	Hospital	Primary care	Academia	Industry	Other	TOTAL
No extended practice	59	61	5	12	1	6	144
Some extended practice	48	37	8	1	0	0	94
TOTAL	107	98	13	13	1	6	238

Figure 5.4. Amalgamated professional activities geocode ('some or no extended practice') by main sector of work (N = 238)



The proportions of pharmacists engaged in some extended patient care services in community, hospital, primary care and academia were 45% (48 pharmacists), 38% (37 pharmacists), 61.5% (8 pharmacists) and 8% (1 pharmacist) respectively. The pharmacist working in industry and the 6 pharmacists working in other sectors did not engage in extended practice. The hospital sector had a lower proportion of pharmacists providing extended patient care services compared to the community and primary care sectors. Interestingly, since this study was conducted, a review in England has recommended that pharmacists and pharmacy technicians in acute hospital trusts should spend much more time on direct patient care activities; and that trusts should use more than 80% of their pharmacy resource for activities which optimise medicines and improve patient safety (Department of Health, 2016). As already mentioned, the majority of pharmacists in academia undertook advanced activities such as research and education, and were thus unlikely to provide direct patient care services.

5.2.2 CPD activities

381 pharmacists (= 90.9% of the 419 respondents) provided information about the different CPD activities they had undertaken. They had done 2010 CPD activities in total. The 2010 different CPD activities were categorised into unstructured, semi-structured and structured learning. The number of respondents and responses for each category of CPD activity are summarised in table 5.13. Multiple response sets were created for each of these categories of CPD activity to allow exploration of the data (Acton *et al*, 2009).

Table 5.13. Number of respondents and responses for each category of CPD activity

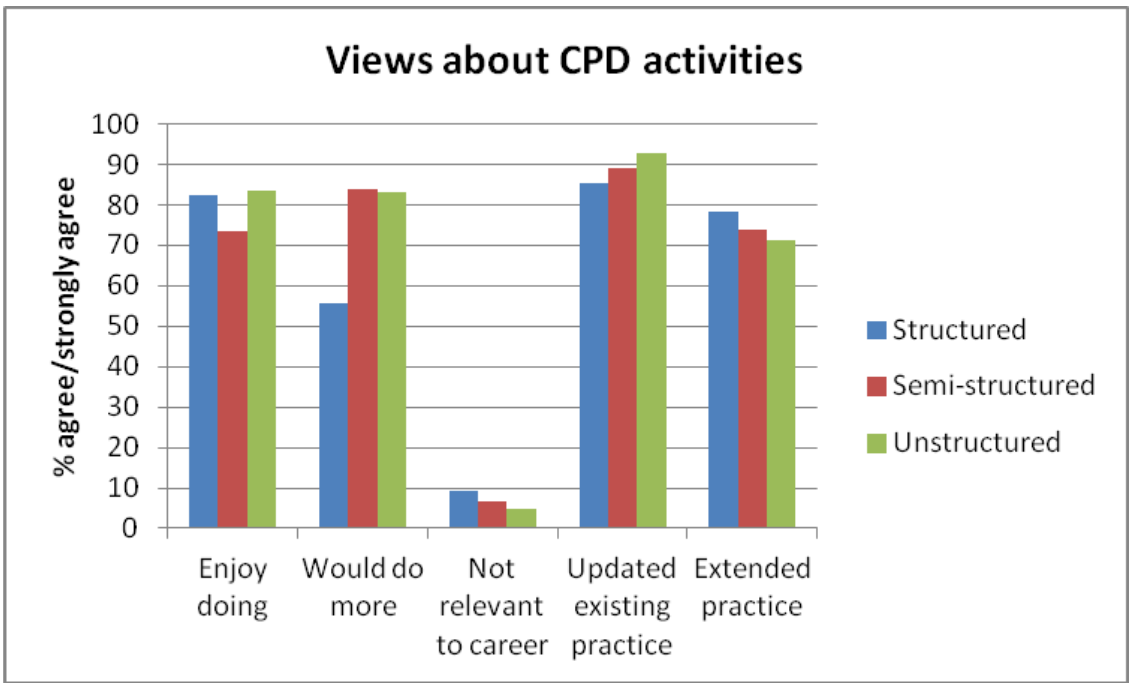
Category	CPD activities	No. of respondents	No. of responses (multiple response set)
Unstructured	**Informal** (unstructured unscheduled on-the-job learning occurring as part of day-to-day practice) **Live** (unstructured scheduled live workshops and/or roadshows) **DL** (unstructured scheduled online and/or printed distance learning courses)	315	831
Semi-structured	**Short accredited courses** (that are a pre-requisite to service delivery)	234	517
Structured	**CE** (traditional continuing education postgraduate degree course incorporating written assignments and a final examination) **NMP** (standalone non-medical prescribing course using a hybrid (WBL / CE) educational approach (practice activities and portfolio assessment, plus written assignments but no final examination)) **WBL** (structured work-based learning programme using practice activities and portfolio assessment) **Doctorate** **(**PhD or DPharm (self-directed learning))	215	662
Total		381	2010

Respondents were asked for their views about each type of CPD activity. They were given five statements and asked to indicate their degree of agreement or disagreement on a five-point Likert scale (Bryman & Cramer, 2011). For each of the three multiple response sets, a score of 4 or more (agree or strongly agree) was taken to indicate agreement with the statement. The percentage agreement with each statement for each type of CPD activity is given in Table 5.14. These results are summarised in Figure 5.5.

Table 5.14. Views about CPD activities by type (N = 2010 responses from 381 respondents)

View about CPD activity	Type of CPD activity	% agree or strongly agree
I enjoy this type of learning	Structured Semi-structured Unstructured	82.54% 73.56% 83.57%
I would be willing to do more of this type of learning in the future	Structured Semi-structured Unstructured	55.79% 83.89% 83.07%
This type of learning is not relevant to my career	Structured Semi-structured Unstructured	9.13% 6.67% 4.77%
This type of learning helps me to update my existing professional practice	Structured Semi-structured Unstructured	85.16% 88.95% 92.7%
This type of learning helps me to extend my professional practice and/or take on new roles	Structured Semi-structured Unstructured	78.42% 73.94% 71.4%

Figure 5.5. Views about CPD activities (N = 2010 responses from 381 respondents)



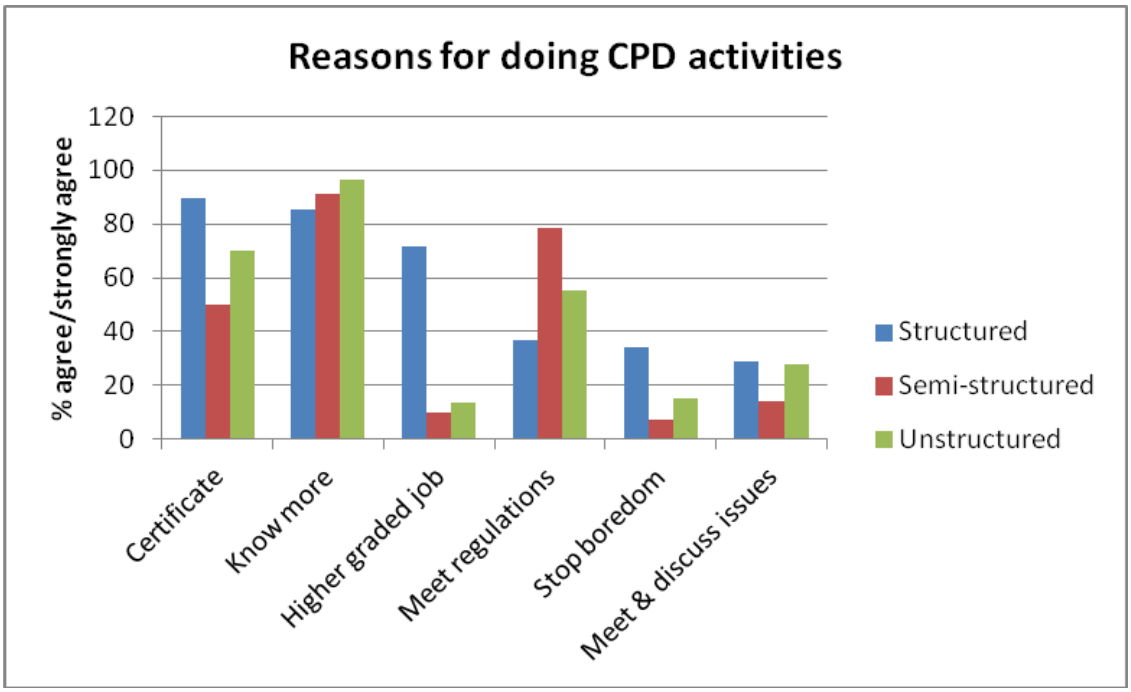
The percentage agreement with the statement 'I enjoy this type of learning' was 82.5% for structured learning, 73.6% for semi-structured learning and 83.6% for unstructured learning. High levels of agreement were seen for doing more semi-structured learning and unstructured learning (83.9% and 83.1% respectively), with the level for structured learning being lower at 55.8%. All types of CPD activity were relevant to individuals' careers. In addition, higher levels of agreement were seen for updating existing practice than for extending practice for all types of CPD activity.

Respondents were also asked to give their reasons for doing each type of CPD activity. They were given six statements and asked to indicate their degree of agreement or disagreement on a five-point Likert scale (Bryman & Cramer, 2011). For each of the three multiple response sets, a score of 4 or more (agree or strongly agree) was taken to indicate agreement with the statement. The percentage agreement with each statement for each type of CPD activity is given in table 5.15. These results are illustrated in Figure 5.6.

Table 5.15. Reasons for undertaking CPD activities by type (N = 2010 responses from 381 respondents)

Reason for doing CPD activity	Type of CPD activity	% agree or strongly agree
To obtain a certificate of completion or qualification	Structured Semi-structured Unstructured	89.67% 49.81% 69.9%
To become a more knowledgeable and/or competent practitioner	Structured Semi-structured Unstructured	85.6% 91.46% 96.47%
To obtain (or be eligible for) a higher graded and/or better paid job	Structured Semi-structured Unstructured	71.87% 9.74% 13.77%
To comply with requirements stipulated by my employer and/or the pharmacy regulator	Structured Semi-structured Unstructured	36.96% 78.47% 55.3%
To stop me from getting bored	Structured Semi-structured Unstructured	34.21% 7.39% 15.0%
To meet up and discuss issues with fellow professionals	Structured Semi-structured Unstructured	28.65% 14.31% 27.75%

Figure 5.6. Reasons for doing CPD activities (N = 2010 responses from 381 respondents)



There was a high level of agreement (89.7%) with doing structured learning to obtain a certificate of completion or qualification. This fits with a cognitive educational approach, where individuals are thought to be motivated by external pressures such as achievement of qualifications and grades (Knowles, 1984). This suggests that individuals doing structured learning were preoccupied with demonstrating their competence to others, which is analogous to extrinsic motivation (Fairchild *et al*, 2005). Lower levels of agreement were seen for semi-structured and unstructured learning (49.8% and 69.9% respectively). All types of CPD activity were done to become a more knowledgeable and/or competent practitioner. The highest level of agreement (96.5%) was seen for unstructured learning, suggesting that individuals were intrinsically motivated to undertake this type of CPD activity (Fairchild *et al*, 2005). As discussed in section 3.2, this is common in self-directed learning which has a humanist approach, and where the motivation to learn is to increase understanding and to develop as an individual (Cross, 1981; Merriam *et al*, 2007). However, others have suggested that individuals tend to use unstructured learning to become a knowledgeable practitioner when there is a lack of structured training and development provided (Fuller & Unwin, 2004b), or to compensate for gaps in formal learning (Fraser, 2010). Only structured learning was done to get a higher graded job. The level of agreement with doing semi-structured learning to comply with requirements was high at

78.5%. As pharmacists are only required by the pharmacy regulator to undertake self-directed learning, it can be assumed that this requirement had been stipulated by their employer. Lower levels of agreement were seen for unstructured learning (55.3%) and structured learning (37%). Low levels of agreement were seen for doing all types of CPD activity to prevent boredom or to meet up and discuss issues with fellow professionals.

As seen in table 5.13, in this study the category of structured learning comprised four different types of CPD activity, each with a different educational approach:

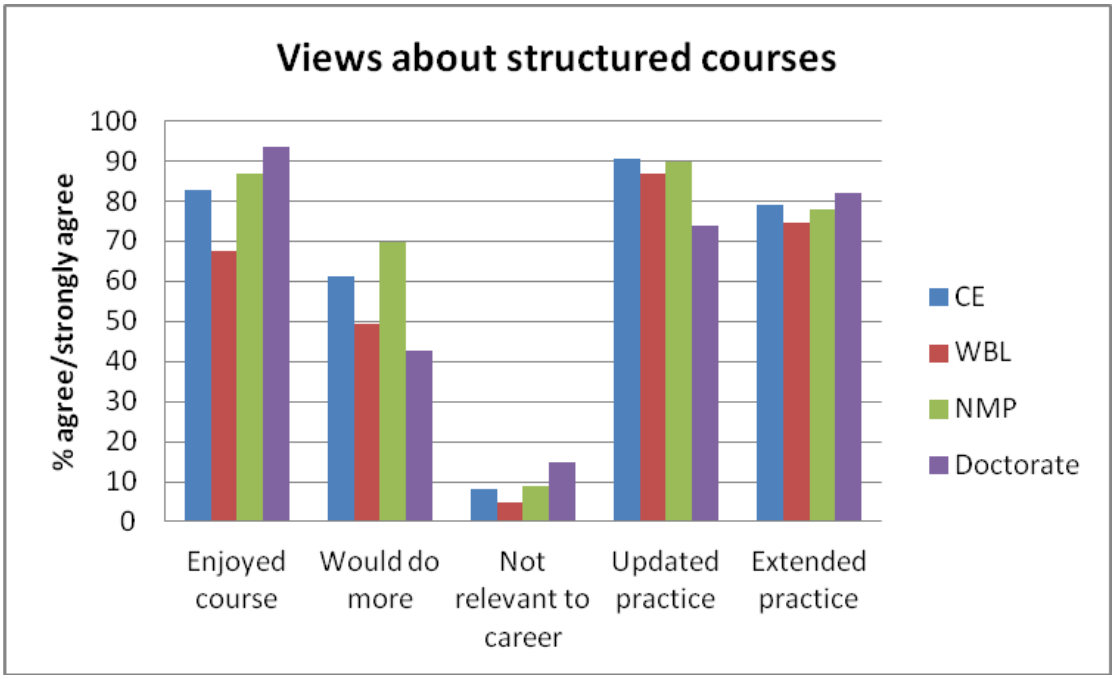
CE	traditional continuing education (CE) postgraduate degree course incorporating written assignments and a final examination
WBL	structured work-based learning (WBL) programme using practice activities and portfolio assessment
NMP	standalone non-medical prescribing (NMP) course using a hybrid educational approach (practice activities and portfolio assessment, plus written assignments but no final examination)
Doctorate	PhD or DPharm (self-directed learning)

The multiple response set for structured learning was subdivided accordingly to allow further exploration of respondents' views about and reasons for doing structured courses, using the same statements as earlier. 215 respondents had done a total of 662 structured courses. The percentage agreement with each statement for each type of structured course is given in tables 5.16 and 5.17, and the results are illustrated in Figures 5.7 and 5.8.

Table 5.16. Views about all structured courses by type (N = 662 responses from 215 respondents)

% Agree or strongly agree	CE	WBL	NMP	Doctorate
I enjoyed the course	82.58%	67.47%	86.66%	93.44%
I would be willing to do more courses like this	61.23%	49.39%	69.92%	42.62%
The course was not relevant to my career	7.98%	4.82%	8.95%	14.76%
The course helped me to update my existing professional practice	90.5%	86.75%	89.62%	73.77%
The course helped me to extend my professional practice and/or take on new roles	79.06%	74.70%	77.94%	81.97%

Figure 5.7. Views about structured courses (N = 662 responses from 215 respondents)

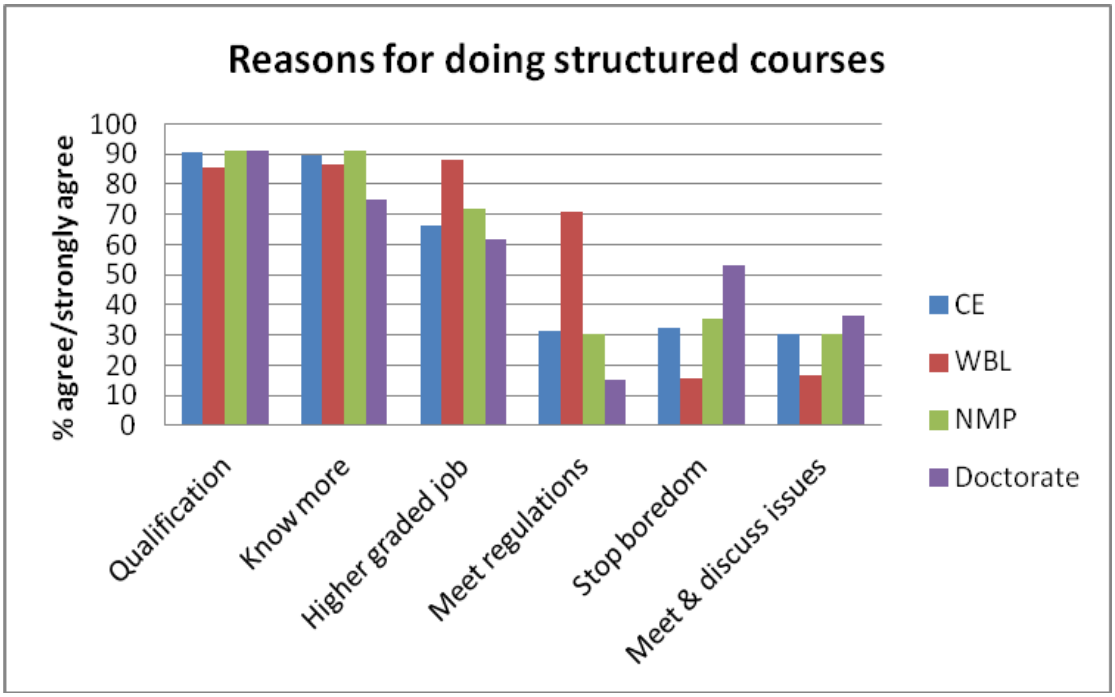


There was a very high level of agreement with the statement 'I enjoyed the course' for doctorate courses (93.4%), which involve self-directed learning. The levels of agreement were also high for traditional continuing education (CE) courses (82.6%), which use a cognitivist approach, and the non-medical prescribing (NMP) course (86.7%), which uses a hybrid educational approach. A lower level of agreement was seen for work-based learning (WBL) programmes (67.5%), which use a constructivist approach. There was some agreement that respondents would do more structured courses. All structured courses were relevant to individuals' careers. In addition, all structured courses were thought to both update existing practice and extend professional practice. Interestingly, for doctorate courses only, higher levels of agreement were seen for extending practice (82%) than for updating existing practice (73.8%).

Table 5.17. Reasons for doing all structured courses by type (N = 662 responses from 215 respondents)

% Agree or strongly agree	CE	WBL	NMP	Doctorate
To obtain an additional qualification	90.72%	85.54%	91.04%	91.38%
To become a more knowledgeable and/or competent practitioner	89.6%	86.75%	91.05%	75%
To obtain (or be eligible for) a higher graded and/or better paid job	66.22%	87.95%	71.65%	61.67%
To comply with requirements stipulated by my employer and/or the pharmacy regulator	31.38%	71.08%	30.37%	15.0%
To stop me from getting bored	32.54%	15.66%	35.29%	53.33%
To meet up and discuss issues with fellow	30.45%	16.87%	30.6%	36.67%

Figure 5.8. Reasons for doing structured courses (N = 662 responses from 215 respondents)



There was a high level of agreement with doing all structured courses to obtain an additional qualification. This is common in adult learners who often want some sort of recognition for their learning (Cross, 1981), and fits with a cognitive educational approach to learning (Knowles, 1984) and extrinsic motivation (Fairchild *et al*, 2005), as discussed earlier. High levels of agreement were also seen for doing structured courses to become a more knowledgeable and/or competent practitioner, which is more suggestive of intrinsic motivation (Fairchild *et al*, 2005). The levels of agreement

for doing CE, WBL, NMP and doctorate courses to get a higher graded job were 66.2%, 88%, 71.7% and 61.7% respectively. The level of agreement for doing WBL courses to comply with requirements stipulated by the employer and/or the pharmacy regulator was 71%. Lower levels of agreement were seen for CE courses (31.4%), the NMP course (30.4%) and doctorate courses (15%). There was some agreement (53.3%) that respondents did doctorate courses to stop them from getting bored. Levels were lower for CE (32.5%), WBL (15.7%) and NMP (35.3%) courses. Levels of agreement were also low for doing all types of structured learning to meet up and discuss issues with fellow professionals.

Geometric coding was used again to convert the multiple response data into categorical variables that are amenable to confirmatory statistical analysis. Interestingly, Mathers *et al* (2012, p. 4) have suggested that "CPD is equivalent to a complex intervention and as such traditional quantitative methods cannot be employed to understand its impact", lending further support for the use of this tool.

CPD activities were categorised according to the different types of CPD activity outlined in table 5.13, and were assigned the following eight values to enable geometric coding:

1 = Informal
2 = Live
4 = DL
8 = Semi-structured
16 = CE
32 = NMP
64 = WBL
128 = Doctorate

These values were used to create the 'type of learning' geocodes incorporating all 2010 CPD activities undertaken by the 381 respondents.

The 'type of learning' geocode (the sum of the values of the CPD activities that each respondent said they did) was then calculated (Acton *et al*, 2009). Eight variables could yield up to 255 unique combinations (Acton *et al*, 2009). However, only 73

unique combinations out of the possible 255 were seen in this study. This was because few pharmacists had done more than one type of structured learning. Pharmacists who had done a doctorate programme were unlikely to have done another type of structured learning (CE, WBL or NMP). The same was true for WBL, although some pharmacists had done a combination of CE and NMP.

The 73 combinations were grouped together into the following six 'type of learning' geocode clusters (Acton *et al*, 2009):

1. Geo-Unstructured = unstructured only *(geocode = 1 - 7)*
2. Geo-Semi-structured = semi-structured +/- unstructured *(geocodes = 8 - 15)*
3. Geo-CE = CE +/- semi-structured +/- unstructured *(geocodes = 16 - 31)*
4. Geo-NMP = NMP +/- CE +/- semi-structured +/- unstructured *(geocodes = 32 - 63)*
5. Geo-WBL = WBL +/- NMP +/- CE +/- semi-structured +/- unstructured *(geocodes = 64 – 127)*
6. Geo-Doctorate = doctorate +/- any other type of learning *(geocodes = 128 - 255)*

The results are summarised in table 5.18.

Table 5.18. Summary of respondents by 'type of learning' geocode (N = 381)

Type of learning geocode	Frequency	%
Geo-Unstructured	37	9.7%
Geo-Semi-structured	137	36.0%
Geo-CE	74	19.4%
Geo-NMP	56	14.7%
Geo-WBL	36	9.4%
Geo-Doctorate	41	10.8%
Total	381	100%

The majority of respondents (n = 137 (36%)) had done Semi-structured learning (Geo-Semi-structured). Almost a fifth (n = 74) had done a traditional continuing education (CE) postgraduate degree course (Geo-CE), and almost 15% (n = 56) had done the standalone non-medical prescribing (NMP) course (Geo-NMP). Approximately 10% (n = 37) had done unstructured learning only (Geo-Unstructured), with similar proportions having done structured work-based learning (WBL) (Geo-WBL) and doctorate (Geo-Doctorate) programmes (n = 36 and 41 respectively).

Using a Chi square test, no association was found between a pharmacist's 'type of learning' geocode and their gender. However, an association was found between a pharmacist's 'type of learning' geocode and their age ($p < .001$, Chi-Square = 105.105, df = 36) and also their main sector of work ($p < .001$, Chi-Square = 323.463, df = 30). The results are summarised in tables 5.19 and 5.20, and illustrated in Figures 5.9 and 5.10.

Figure 5.9. 'Type of learning' geocode by age (N = 381 respondents)

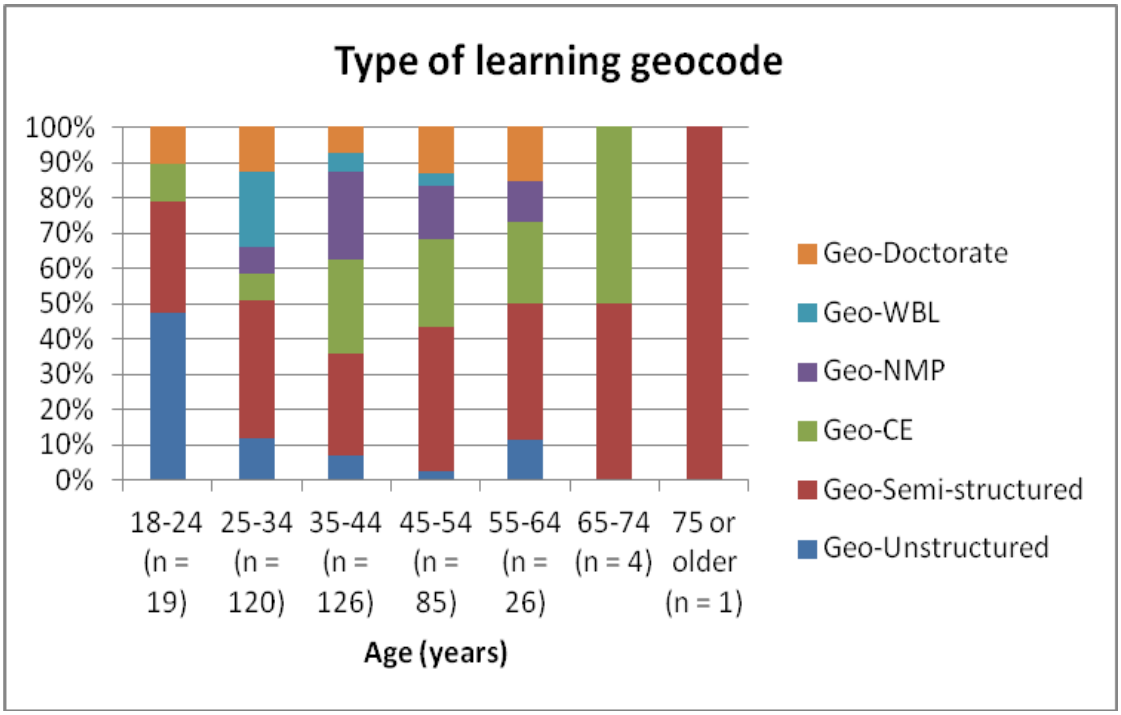


Table 5.19. 'Type of learning' geocode by age (N = 381)

Age (years)	Type of learning geocode	N	%
18 to 24 (N = 19)	Geo-Unstructured	9	47.37%
	Geo-Semi-structured	6	31.58%
	Geo-CE	2	10.53%
	Geo-NMP	0	0
	Geo-WBL	0	0
	Geo-Doctorate	2	10.53%
25 to 34 (N = 120)	Geo-Unstructured	14	11.67%
	Geo-Semi-structured	47	39.17%
	Geo-CE	9	7.50%
	Geo-NMP	9	7.50%
	Geo-WBL	26	21.67%
	Geo-Doctorate	15	12.50%
35 to 44 (N = 126)	Geo-Unstructured	9	7.14%
	Geo-Semi-structured	36	28.57%
	Geo-CE	34	26.98%
	Geo-NMP	31	24.60%
	Geo-WBL	7	5.56%
	Geo-Doctorate	9	7.14%
45 to 54 (N = 85)	Geo-Unstructured	2	2.35%
	Geo-Semi-structured	35	41.18%
	Geo-CE	21	24.71%
	Geo-NMP	13	15.29%
	Geo-WBL	3	3.53%
	Geo-Doctorate	11	12.94%
55 to 64 (N = 26)	Geo-Unstructured	3	11.54%
	Geo-Semi-structured	10	38.46%
	Geo-CE	6	23.08%
	Geo-NMP	3	11.54%
	Geo-WBL	0	0
	Geo-Doctorate	4	15.38%
65 to 74 (N = 4)	Geo-Unstructured	0	0
	Geo-Semi-structured	2	50.00%
	Geo-CE	2	50.00%
	Geo-NMP	0	0
	Geo-WBL	0	0
	Geo-Doctorate	0	0
75 or older (N = 1)	Geo-Unstructured	0	0
	Geo-Semi-structured	1	100%
	Geo-CE	0	0
	Geo-NMP	0	0
	Geo-WBL	0	0
	Geo-Doctorate	0	0

All of the 381 respondents who had provided information about the different CPD activities they had undertaken had also specified their age. The main differences in the 'type of learning' geocodes were seen at the extremes of the age range. Fewer differences were seen between those pharmacists of normal working age (25 to 65 years). However, within the normal working age range, pharmacists aged 25 to 34 years undertook a higher proportion of Geo-WBL and a lower proportion of Geo-CE and Geo-NMP activities than their older colleagues. This may be because structured work-based learning programmes (WBL) were only introduced in Northern Ireland in 2008. Indeed, nobody over the age of 54 years had done a WBL programme. Pharmacists in all age groups did semi-structured learning (Geo-Semi-structured). Pharmacists up to the age of 74 years had done a CE postgraduate degree (Geo-CE), with higher proportions seen from age 35 years onwards. Only one pharmacist was over the age of 75 years, and they had done semi-structured learning (Geo-Semi-structured). Pharmacists between the ages of 25 and 65 years had done the non-medical prescribing (NMP) course (Geo-NMP). Legally, pharmacists can commence prescribing training two years' post-registration which is probably why nobody in the 18 to 24 year old group had done this course. Pharmacists of all ages up to 64 years had done a doctorate programme.

Figure 5.10. 'Type of learning' geocode by main sector of work (N = 365 respondents)

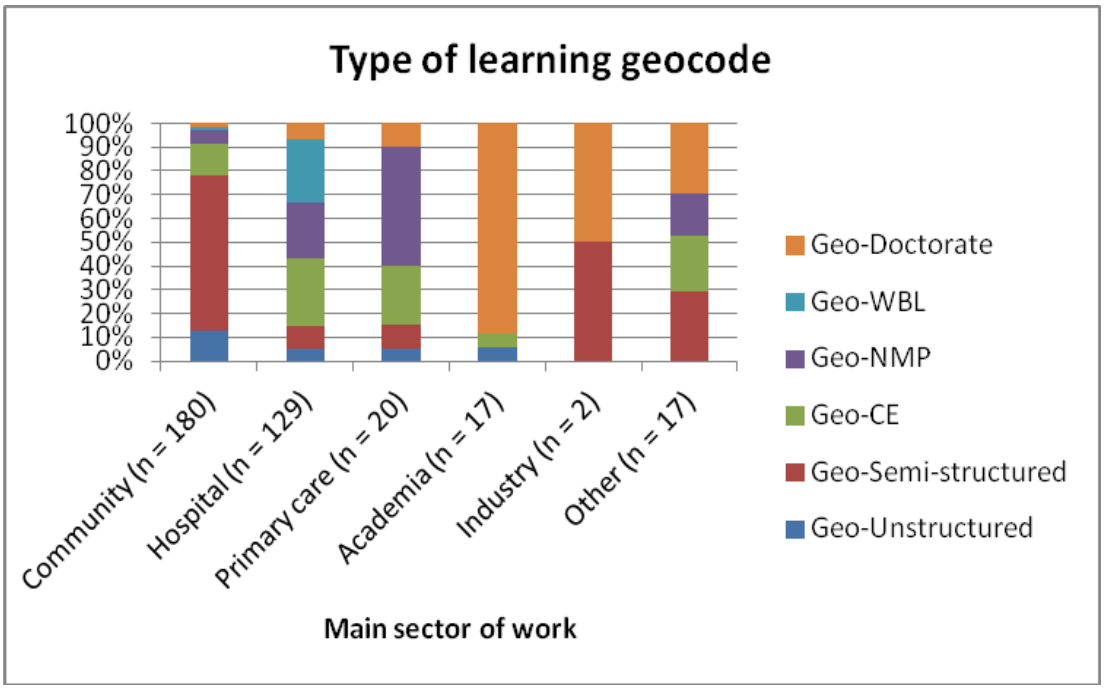


Table 5.20. 'Type of learning' geocode by main sector of work (N = 365)

Main sector of work	Type of learning geocode	N	%
Community (N = 180)	Geo-Unstructured	23	12.78%
	Geo-Semi-structured	117	65.00%
	Geo-CE	24	13.33%
	Geo-NMP	11	6.11%
	Geo-WBL	2	1.11%
	Geo-Doctorate	3	1.67%
Hospital (N = 129)	Geo-Unstructured	7	5.43%
	Geo-Semi-structured	12	9.30%
	Geo-CE	37	28.68%
	Geo-NMP	30	23.26%
	Geo-WBL	34	26.36%
	Geo-Doctorate	9	6.98%
Primary care (N = 20)	Geo-Unstructured	1	5.00%
	Geo-Semi-structured	2	10.00%
	Geo-CE	5	25.00%
	Geo-NMP	10	50.00%
	Geo-WBL	0	0
	Geo-Doctorate	2	10.00%
Academia (N = 17)	Geo-Unstructured	1	5.88%
	Geo-Semi-structured	0	0
	Geo-CE	1	5.88%
	Geo-NMP	0	0
	Geo-WBL	0	0
	Geo-Doctorate	15	88.24%
Industry (N = 2)	Geo-Unstructured	0	0
	Geo-Semi-structured	1	50.00%
	Geo-CE	0	0
	Geo-NMP	0	0
	Geo-WBL	0	0
	Geo-Doctorate	1	50.00%
Other (N = 17)	Geo-Unstructured	0	0
	Geo-Semi-structured	5	29.41%
	Geo-CE	4	23.53%
	Geo-NMP	3	17.65%
	Geo-WBL	0	0
	Geo-Doctorate	5	29.41%

365 of the 381 respondents (= 95.8%) who had provided information about the different CPD activities they had undertaken had also specified their main sector of work. Approximately 13% of pharmacists in the community (n = 23) and 5% of pharmacists in hospital (n = 7), primary care (n = 1) and academia (n = 1) had done unstructured learning only (Geo-Unstructured). Pharmacists in all sectors except academia undertook semi-structured learning (Geo-Semi-structured). Community pharmacy had the highest proportion (65%; n = 117) with hospital and primary care having the lowest (approximately 10%; n = 12 and 2 respectively). Pharmacists in hospital and primary care had a greater spread of CPD activities compared to pharmacists working in other sectors. Indeed, the profiles for the hospital and primary care sectors looked fairly similar; the main difference being that 50% of pharmacists in primary care (n = 10) did Geo-NMP, whilst in hospital the proportion was approximately 23% (n = 30) with approximately 29% (n = 34) doing Geo-WBL instead. At the time this study was conducted, structured work-based learning (WBL) programmes were available only to pharmacists working in the hospital sector. The majority (15) of the 17 pharmacists in academia did Geo-Doctorate, with one doing Geo-CE and one doing Geo-Unstructured. The two respondents working in industry specified their CPD activities; one did semi-structured learning (Geo-Semi-structured) and the other did Geo-Doctorate. The 17 pharmacists working in other sectors did a spread of CPD activities; 5 did Geo-Semi-structured, 4 did Geo-CE, 3 did Geo-NMP and 5 did Geo-Doctorate.

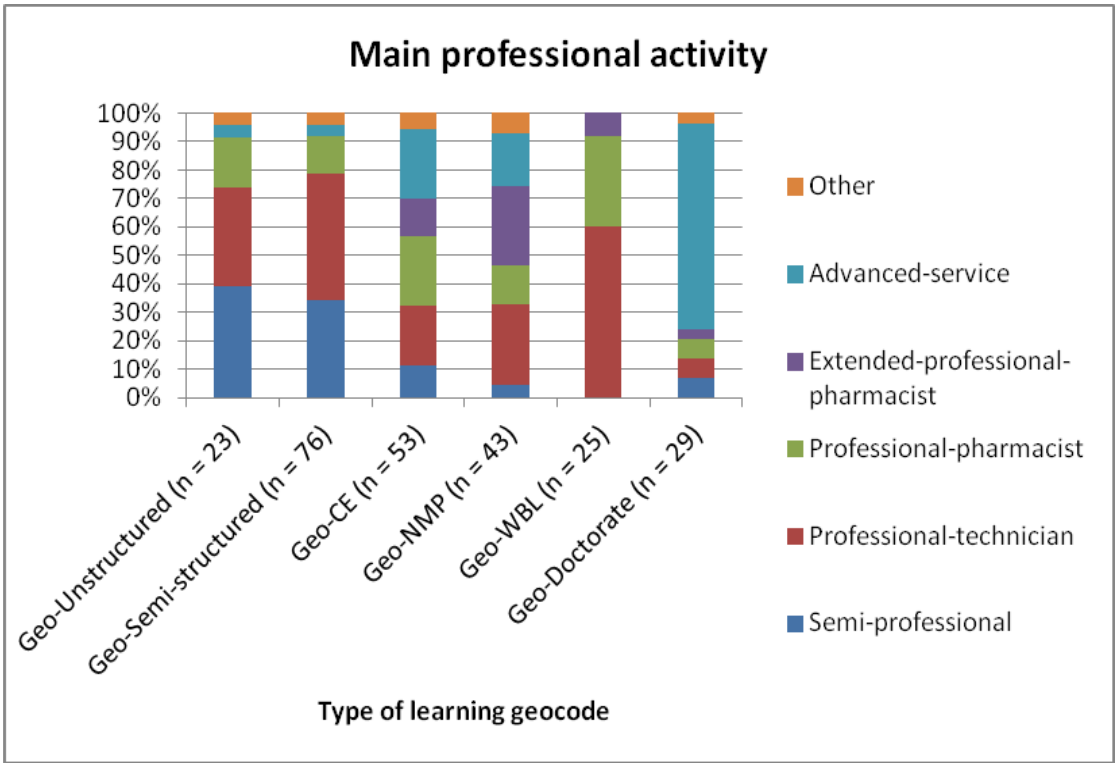
5.2.3 Influence of CPD activities on professional activities

In order to ascertain whether pharmacists' CPD activities influenced the professional activities they were engaged in, the 'type of learning' geocode and main professional activities were firstly considered. 249 of the 381 respondents (= 65.35%) who had provided information about the different CPD activities they had undertaken had also specified their main professional activity. The results are summarised in table 5.21 and illustrated in Figure 5.11.

Table 5.21. Main professional activity by 'type of learning' geocode (N = 249)

Type of learning geocode	Main professional activity	N	%
Geo-Unstructured (N = 23)	Semi-professional	9	39.13%
	Professional-technician	8	34.78%
	Professional-pharmacist	4	17.39%
	Extended-professional-pharmacist	0	0
	Advanced-service	1	4.35%
	Other	1	4.35%
Geo-Semi-structured (N = 76)	Semi-professional	26	34.21%
	Professional-technician	34	44.74%
	Professional-pharmacist	10	13.16%
	Extended-professional-pharmacist	0	0
	Advanced-service	3	3.95%
	Other	3	3.95%
Geo-CE (N = 53)	Semi-professional	6	11.32%
	Professional-technician	11	20.75%
	Professional-pharmacist	13	24.53%
	Extended-professional-pharmacist	7	13.21%
	Advanced-service	13	24.53%
	Other	3	5.66%
Geo-NMP (N = 43)	Semi-professional	2	4.65%
	Professional-technician	12	27.91%
	Professional-pharmacist	6	13.95%
	Extended-professional-pharmacist	12	27.91%
	Advanced-service	8	18.60%
	Other	3	6.98%
Geo-WBL (N = 25)	Semi-professional	0	0
	Professional-technician	15	60.00%
	Professional-pharmacist	8	32.00%
	Extended-professional-pharmacist	2	8.00%
	Advanced-service	0	0
	Other	0	0
Geo-Doctorate (N = 29)	Semi-professional	2	6.90%
	Professional-technician	2	6.90%
	Professional-pharmacist	2	6.90%
	Extended-professional-pharmacist	1	3.45%
	Advanced-service	21	72.41%
	Other	1	3.45%

Figure 5.11. Main professional activity by 'type of learning' geocode (N = 249)



Using a Chi square test, an association was found between a pharmacist's 'type of learning' geocode and their main professional activity ($p < .001$, Chi-Square = 146.916, df = 25).

The highest proportion of pharmacists who had done unstructured learning only (Geo-Unstructured) (39.1%, n = 9) engaged in Semi-professional activities as their main professional practice. Therefore, the pharmacists who rely solely on this type of learning for their CPD still seem to be entrenched in traditional dispensing roles that can be performed by any member of the pharmacy team. As mentioned previously, this type of learning is the minimum CPD requirement stipulated by the pharmacy regulator in Northern Ireland (Pharmaceutical Society of Northern Ireland, 2014), and focuses on updating and maintaining current practice. The other types of learning included in this study are over and above this minimum standard. The second highest proportion of pharmacists who had done unstructured learning only (Geo-Unstructured) (34.8%, n = 8) engaged in Professional-technician activities as their main professional practice. These activities would have been categorised as Professional-pharmacist activities in previous studies. Nonetheless, almost three quarters of pharmacists who had done unstructured learning only were spending most of their time doing activities

that did not need to be performed by a pharmacist. 17.4% of this group of pharmacists (n = 4) spent most of their time doing essential services that must be performed by a pharmacist (Professional-pharmacist). Interestingly, no pharmacists who had done unstructured learning only did extended patient care activities (Extended-professional-pharmacist) as their main activity. The remaining 9% of pharmacists did Advanced-service (n = 1) and other activities (n = 1).

As illustrated in Figure 5.11, the profile for pharmacists who had done Semi-structured learning in addition to unstructured learning (Geo-Semi-structured) was similar to those who had done unstructured learning only (Geo-Unstructured). The main difference was that their main professional activity was Professional-technician (44.7%, n = 34), and this was followed by Semi-professional activities (34.2%, n = 26). This still meant that almost 80% of them were spending most of their time doing activities that did not need to be performed by a pharmacist. 13.2% of them (n = 10) did Professional-pharmacist activities and, again, no pharmacists in this group did extended patient care activities (Extended-professional-pharmacist) as their main activity. This was surprising, because this type of learning is designed to enable pharmacists to deliver specific extended patient care services. The remaining 8% of pharmacists did Advanced-service (n = 3) and other activities (n = 3).

Those pharmacists who had done a traditional continuing education (CE) postgraduate degree course and no other form of structured learning (Geo-CE) did Professional-pharmacist (24.5%, n = 13) and Advanced-service activities (24.5%, n = 13) as their main professional activities. This was followed by Professional-technician activities (20.8%, n = 11). 13.2% of pharmacists in this group (n = 7) did extended patient care activities (Extended-professional-pharmacist) as their main activity, and 11.3% (n = 6) did Semi-professional activities. This was an improvement on the main activities undertaken by pharmacists who did Geo-Unstructured and Geo-Semi-structured learning. The remaining 5.7% of pharmacists (n = 3) did other activities.

Pharmacists who had done the non-medical prescribing (NMP) course (Geo-NMP) had a fairly similar profile to those who had done Geo-CE. However, the main professional activities for this group were Extended-professional-pharmacist (27.9%, n = 12) and Professional-technician activities (27.9%, n = 12). Completion of the NMP course allows pharmacists to undertake a specific extended patient care activity (non-medical

prescribing). Therefore, it was not surprising to find that this group had the highest proportion of pharmacists engaged in extended practice as their main professional activity. Indeed, it may even have been anticipated that the proportion would have been greater than 27.9%. 18.6% of pharmacists (n = 8) undertook Advanced-service activities, and 14% (n = 6) undertook Professional-pharmacist activities. Only 4.7% of pharmacists in this group (n = 2) undertook Semi-professional activities as their main professional activity. The remaining 7% of pharmacists (n = 3) did other activities.

A very different picture was seen for pharmacists who had done a structured work-based learning (WBL) programme (Geo-WBL). 60% of this group (n = 15) did Professional-technician activities as their main professional activity. Although these activities would have been categorised as Professional-pharmacist activities in previous studies, they can now be performed by suitably trained and accredited pharmacy technicians. 32% (n = 8) did Professional-pharmacist activities, and 8% (n = 2) did Extended-professional-pharmacist activities. Interestingly, no pharmacists did Semi-professional activities as their main professional activity. This was the only group where this was the case. No pharmacists in this group reported doing Advanced-service or other activities as their main professional activity. It should be noted that pharmacists in this group had a lower age range than respondents overall, and nobody over the age of 54 years had done a WBL programme.

The picture was different again for pharmacists who had done a doctorate programme (Geo-Doctorate). The majority of these pharmacists (72.4%, n = 21) did Advanced-service activities as their main professional activity. For Semi-professional, Professional-technician and Professional-pharmacist activities the proportions were all 6.9% (n = 2); and for Extended-professional-pharmacist and other activities the proportions were both 3.5% (n = 1). As seen in section 5.2.2, most pharmacists who had done a doctorate programme worked in academia and thus would have had limited patient contact.

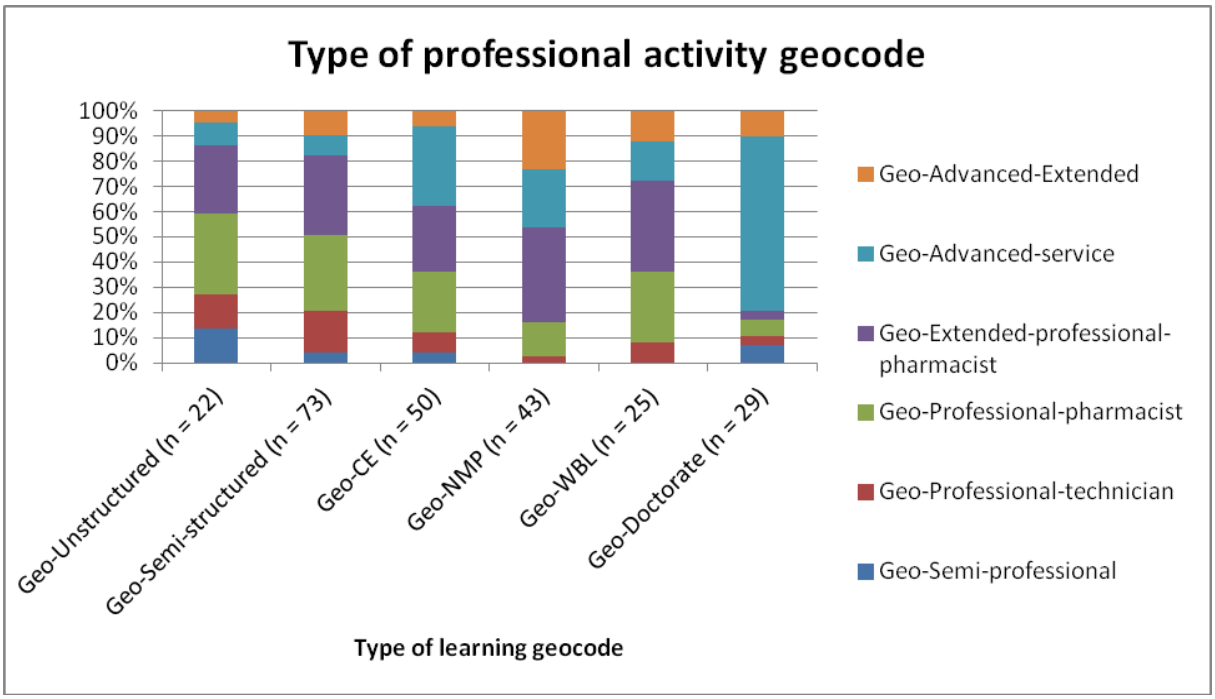
The influence of CPD on all professional practices was considered next by examining the ‘type of learning’ and ‘type of professional activity’ geocodes. As discussed in section 5.2.1, seven of the 249 respondents did ‘Other’ non-professional activities only leaving 242 respondents who were allocated to the six ‘type of professional activity’

geocode clusters. The results are summarised in table 5.22 and illustrated in Figure 5.12.

Table 5.22. 'Type of professional activity' geocode by 'type of learning' geocode (N = 242)

Type of learning geocode	Type of professional activity geocode	N	%
Geo-Unstructured (N = 22)	Geo-Semi-professional	3	13.64%
	Geo-Professional-technician	3	13.64%
	Geo-Professional-pharmacist	7	31.82%
	Geo-Extended-professional-pharmacist	6	27.27%
	Geo-Advanced-service	2	9.09%
	Geo-Advanced-Extended	1	4.54%
Geo-Semi-structured (N = 73)	Geo-Semi-professional	3	4.12%
	Geo-Professional-technician	12	16.44%
	Geo-Professional-pharmacist	22	30.13%
	Geo-Extended-professional-pharmacist	23	31.51%
	Geo-Advanced-service	6	8.22%
	Geo-Advanced-Extended	7	9.59%
Geo-CE (N = 50)	Geo-Semi-professional	2	4.00%
	Geo-Professional-technician	4	8.00%
	Geo-Professional-pharmacist	12	24.00%
	Geo-Extended-professional-pharmacist	13	26.00%
	Geo-Advanced-service	16	32.00%
	Geo-Advanced-Extended	3	6.00%
Geo-NMP (N = 43)	Geo-Semi-professional	0	0
	Geo-Professional-technician	1	2.32%
	Geo-Professional-pharmacist	6	13.95%
	Geo-Extended-professional-pharmacist	16	37.21%
	Geo-Advanced-service	10	23.26%
	Geo-Advanced-Extended	10	23.26%
Geo-WBL (N = 25)	Geo-Semi-professional	0	0
	Geo-Professional-technician	2	8.00%
	Geo-Professional-pharmacist	7	28.00%
	Geo-Extended-professional-pharmacist	9	36.00%
	Geo-Advanced-service	4	16.00%
	Geo-Advanced-Extended	3	12.00%
Geo-Doctorate (N = 29)	Geo-Semi-professional	2	6.90%
	Geo-Professional-technician	1	3.45%
	Geo-Professional-pharmacist	2	6.90%
	Geo-Extended-professional-pharmacist	1	3.45%
	Geo-Advanced-service	20	68.97%
	Geo-Advanced-Extended	3	10.34%

Figure 5.12. 'Type of professional activity' geocode by 'type of learning' geocode (N = 242)



Using a Chi square test, an association was found between a pharmacist's 'type of learning' geocode and their 'type of professional activity' geocode ($p < .001$, Chi-Square = 75.756, df = 25).

Approximately 14% of pharmacists (n = 3) who had done unstructured learning only (Geo-Unstructured) did Semi-professional activities only (Geo-Semi-professional). This was the highest proportion of all the groups. The same proportion did Professional-technician activities in addition to this (Geo-Professional-technician). Therefore approximately 28% of these pharmacists undertook solely activities that do not need to be performed by a pharmacist. Approximately 32% of pharmacists (n = 7) did Professional-pharmacist activities in addition to this (Geo-Professional-pharmacist).

The profile for pharmacists who had done Semi-structured learning in addition to unstructured learning (Geo-Semi-structured) was fairly similar to those who had done unstructured learning only (Geo-Unstructured). A lower proportion (approximately 4%, n = 3) had done Semi-professional activities only (Geo-Semi-professional), and a slightly higher proportion 16.4% (n = 12) had also done Professional-technician activities (Geo- Professional-technician). Therefore approximately 20% of these

pharmacists undertook solely activities that do not need to be performed by a pharmacist. This was approximately 8% lower than the proportion seen for Geo-Unstructured. Approximately 30% of pharmacists (n = 22) did Professional-pharmacist activities in addition to this (Geo-Professional-pharmacist). This was a similar proportion to Geo-Unstructured.

32% of pharmacists (n = 16) who had done a traditional continuing education (CE) postgraduate degree course and no other form of structured learning (Geo-CE) undertook Advanced-service activities (Geo-Advanced-service). 4% (n = 2) did Semi-professional activities only (Geo-Semi-professional), which was the same proportion as those who had done Semi-structured learning (Geo-Semi-structured). 8% (n = 4) had also done Professional-technician activities (Geo-Professional-technician), which was half the proportion of Geo-Semi-structured. Therefore 12% of these pharmacists undertook solely activities that do not need to be performed by a pharmacist. 24% of pharmacists in this group (n = 12) also did Professional-pharmacist activities (Geo-Professional-pharmacist), which was a lower proportion than both Geo-Unstructured and Geo-Semi-structured.

No pharmacists who had done the non-medical prescribing (NMP) course (Geo-NMP) did Semi-professional activities only (Geo-Semi-professional), and only one pharmacist (2.3%) did Professional-technician activities (Geo- Professional-technician). Therefore only 2.3% of these pharmacists undertook solely activities that do not need to be performed by a pharmacist, which was the lowest proportion for all of the groups. 14% of these pharmacists (n = 6) did Professional-pharmacist activities (Geo-Professional-pharmacist) and 23.3% (n = 10) did Advanced-service activities in addition to this (Geo-Advanced-service).

No pharmacists who had done a structured work-based learning (WBL) programme (Geo-WBL) did Semi-professional activities only (Geo-Semi-professional) either. Two pharmacists (8%) did Professional-technician activities (Geo-Professional-technician) which was the same proportion as Geo-CE. Therefore 8% of these pharmacists undertook solely activities that do not need to be performed by a pharmacist. 28% (n = 7) did Professional-pharmacist activities (Geo-Professional-pharmacist) and 16% (n = 4) also did Advanced-service activities (Geo-Advanced-service).

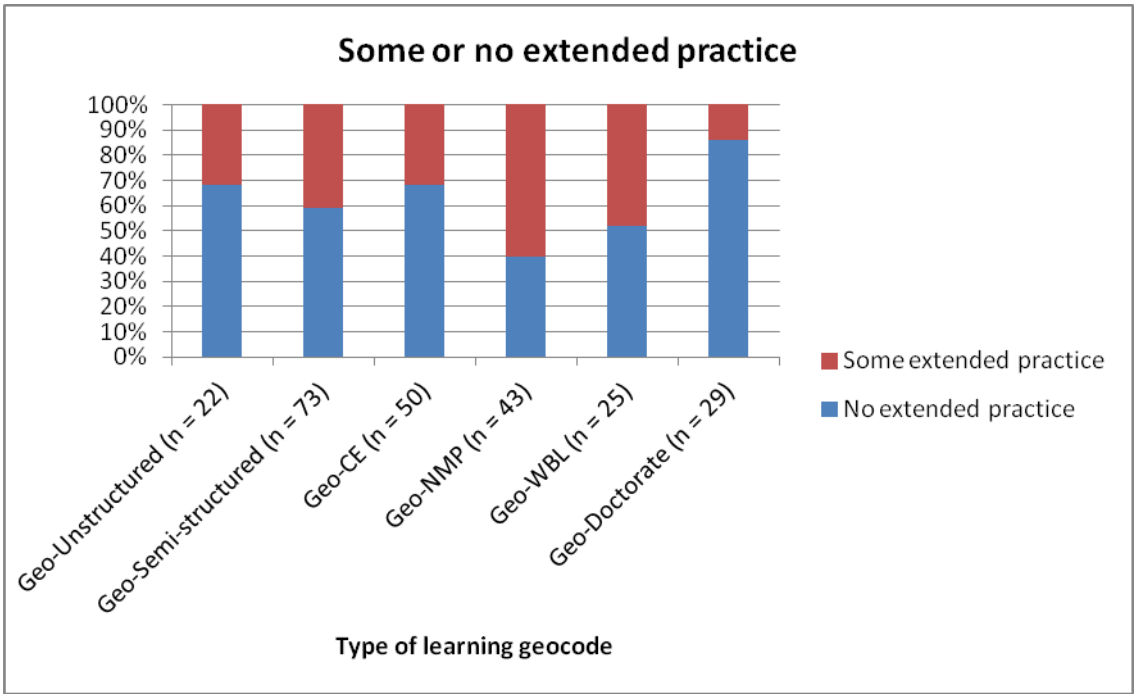
Approximately 10% of pharmacists (n = 3) who had done a doctorate programme (Geo-Doctorate) undertook solely activities that do not need to be performed by a pharmacist (Geo-Semi-professional and Geo-Professional-technician). Approximately 7% of these pharmacists (n = 2) did Professional-pharmacist activities (Geo-Professional-pharmacist). As anticipated, the majority (almost 70%, n = 20) did Advanced-service activities (Geo-Advanced-service).

The 'type of learning' geocode and 'some or no extended practice' geocode were also considered. The results are summarised in table 5.23 and illustrated in Figure 5.13.

Table 5.23. Some or no extended practice by 'type of learning' geocode (N = 242)

Type of learning geocode	Some or no extended practice	N	%
Geo-Unstructured (N = 22)	Some extended practice	7	31.82%
	No extended practice	15	68.18%
Geo-Semi-structured (N = 73)	Some extended practice	30	41.10%
	No extended practice	43	58.90%
Geo-CE (N = 50)	Some extended practice	16	32.00%
	No extended practice	34	68.00%
Geo-NMP (N = 43)	Some extended practice	26	60.47%
	No extended practice	17	39.53%
Geo-WBL (N = 25)	Some extended practice	12	48.00%
	No extended practice	13	52.00%
Geo-Doctorate (N = 29)	Some extended practice	4	13.79%
	No extended practice	25	86.21%

Figure 5.13. Some or no extended practice by 'type of learning' geocode (N = 242)



Using a Chi square test, an association was found between a pharmacist's 'type of learning' geocode and whether or not they had done some extended practice ('some extended practice' and 'no extended practice' geocodes) ($p = .002$, Chi-Square = 18.516, df = 5).

Approximately 32% of pharmacists (n = 7) who had done unstructured learning only (Geo-Unstructured) did some extended practice, and this was taken to be the baseline figure. The proportion of pharmacists who had done semi-structured learning in addition to unstructured learning (Geo-Semi-structured) doing some extended practice was approximately 41% (n = 30), which was 9% higher than the baseline figure. This type of learning is designed to enable pharmacists to deliver specific extended patient care services. Therefore, almost 60% of the pharmacists who had completed these courses (n = 43) did not appear to be applying their learning in their routine practice. However, the reasons for this were not examined in this quantitative study. Interestingly, only 32% pharmacists (n = 16) who had done a traditional continuing education (CE) postgraduate degree course (Geo-CE) did some extended practice. This was the same proportion as the baseline figure for pharmacists who had done unstructured learning only. Approximately 60% of pharmacists (n = 26) who had done the non-medical prescribing (NMP) course (Geo-NMP) did some extended practice, which was the highest proportion for all of the groups and was almost double the

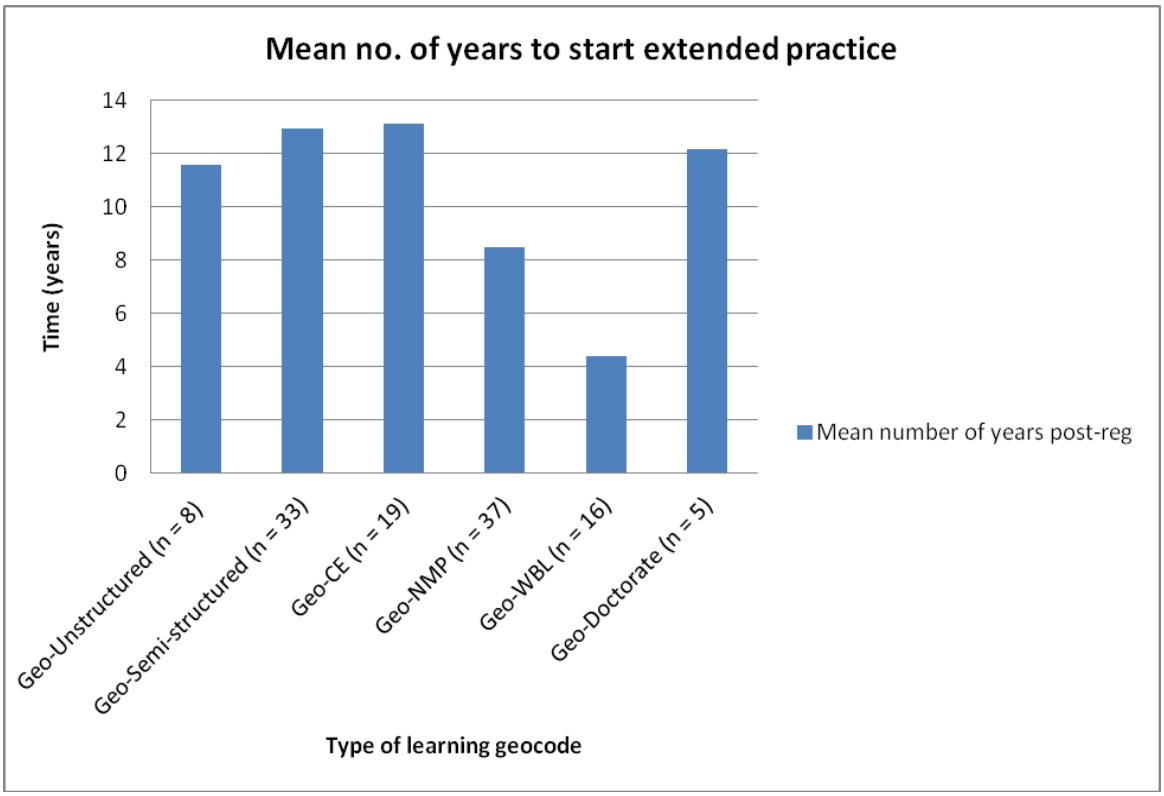
baseline figure. However, this was considerably lower than the figure of approximately 85% of qualified pharmacist prescribers in the UK who were routinely undertaking the specific extended patient care activity of non-medical prescribing (Bourne *et al*, 2016). Indeed, it is only 10% higher than the figure of approximately 50% found by McCann *et al* (2011), despite the removal of one of the main barriers identified in their study; that is the onerous paperwork associated with Clinical Management Plans (CMPs), which are no longer required. This could mean that the remaining two barriers identified by McCann *et al* (2011) (inadequate funding, and inadequate resources to cover core services) were preventing approximately 40% of qualified pharmacist prescribers in this study from prescribing in practice. These two barriers relate to a combination of opportunity and support in the workplace, which Billett (2004, p. 114) has referred as "workplace affordances". However, Rosenthal *et al* (2010, p. 37) have noted that documented efforts to remove identified barriers have not resulted in pharmacy practice change, leading them to speculate "if they really are true barriers or merely excuses." Indeed, it could be possible these pharmacists were not prescribing for "co-participative" reasons "constituted between the affordance of the work practice and how individuals elect to engage in the work practice" (Billett, 2002, p. 466). Nevertheless, a higher proportion of pharmacists who had done the NMP course, which uses a hybrid CE / work-based learning (WBL) approach, were applying their learning in practice (approximately 60%) compared to those who had done semi-structured learning (approximately 41%), which uses a purely cognitive educational approach; even though both the NMP course and semi-structured learning are designed to enable pharmacists to deliver specific extended patient care services. The proportion of pharmacists doing some extended practice who had undertaken a structured work-based learning (WBL) programme (Geo-WBL) was 48% (n = 12). This was 16% higher than the baseline figure, but 12% lower than for Geo-NMP. It also meant that 52% of pharmacists in this group (n = 13) did no extended practice at all, despite the focus in these programme on medicines optimisation. Approximately 14% of pharmacists (n = 4) who had done a doctorate programme (Geo-Doctorate) undertook some extended practice. This was the lowest proportion for all of the groups and was almost half the baseline figure for those who had done unstructured learning only. However, this was to be expected as the majority of pharmacists doing doctorate programmes work in academia and have limited patient contact. Indeed, most of these pharmacists were engaged in Advanced-service activities such as leadership, research and education (Geo-Advanced-service).

This study also considered whether the type of learning undertaken could expedite extended practice. As indicated earlier in tables 5.7 and 5.11, 95 respondents in this study had done a total of 118 extended practices (multiple response set). For each professional practice, pharmacists had been asked to give the (approximate) year that they started doing that activity. They had also been asked to give the year that they registered as a pharmacist. Therefore, for each of the 118 extended practices, it was possible to calculate how long after they registered that the pharmacist started to do the activity. This multiple response set was not amenable to statistical analysis, but mean values could be compared (Acton *et al*, 2009). Thus, the mean number of years' post-registration before starting extended practice was compared for each 'type of learning' geocode. The results are summarised in table 5.24, and illustrated in Figure 5.14.

Table 5.24. Mean number of years post-registration to start extended practice by 'type of learning' geocode (N = 118 responses from 95 respondents)

Type of learning geocode	**No. of responses**	**Mean no. of years post-reg**	**SD**
Geo-Unstructured (N = 7)	8	11.58	5.67
Geo-Semi-structured (N = 30)	33	12.92	11.11
Geo-CE (N = 16)	19	13.1	10.56
Geo-NMP (N = 26)	37	8.49	5.81
Geo-WBL (N = 12)	16	4.39	3.81
Geo-Doctorate (N = 4)	5	12.1667	7.07
TOTAL (N = 95)	118	10.28	7.83

Figure 5.14. Mean number of years post-registration to start extended practice by 'type of learning' geocode (N = 118 responses)



Although it is standard practice in multiple response sets to compare the mean values (Acton *et al*, 2009), it must be pointed out that this particular multiple response set was fairly small (N = 118). In addition, the standard deviation for each 'type of learning' geocode was relatively large, as indicated in table 5.24, suggesting that the distribution of the number of years to start extended practice was widely spread.

The mean number of years to start extended practice for pharmacists who had done unstructured learning only (Geo-Unstructured) was 11.6 years, and was taken to be the baseline figure. For pharmacists who had also done semi-structured learning (Geo-Semi-structured) the figure was 13 years. The figure was also 13 years for pharmacists who had done a traditional continuing education (CE) postgraduate degree course (Geo-CE). The mean number of years to start extended practice for pharmacists who had done the non-medical prescribing (NMP) course (Geo-NMP) was 8.5 years. Although this was a reduction of approximately 3 years compared to the baseline figure, 8.5 years is still quite a long time to wait before a pharmacist starts to provide extended patient care activities. As mentioned in section 2.2, if patients are to benefit, it has been recommended that the majority of pharmacists need to provide

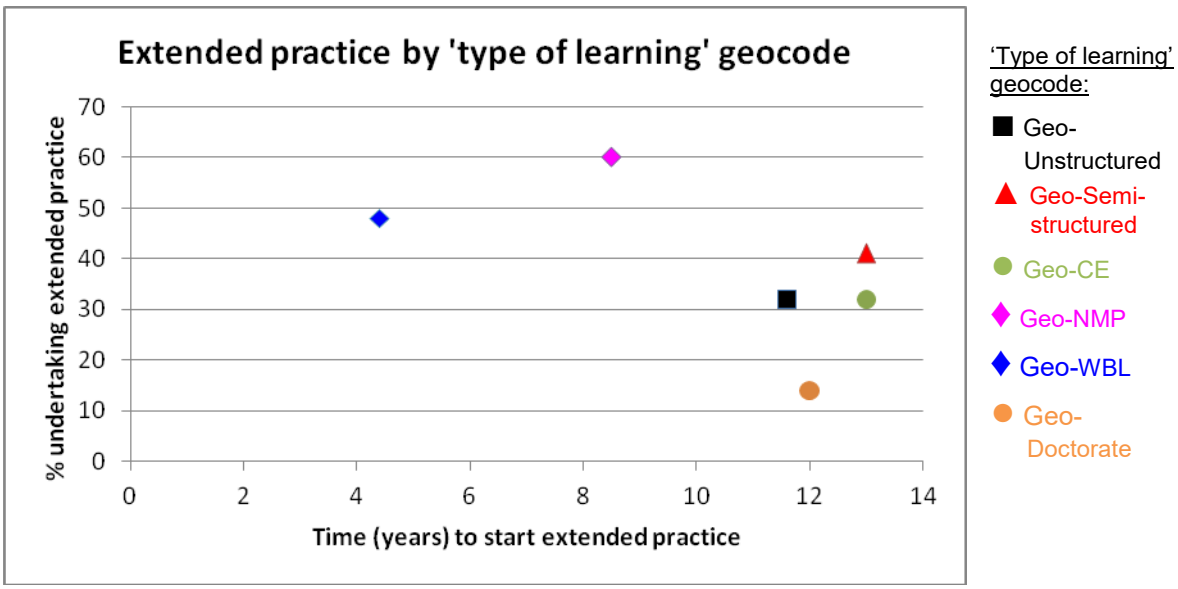
these activities routinely (Jubraj, 2011), not just those who have a number of years' experience. Interestingly, pharmacists who had undertaken a structured work-based learning (WBL) programme (Geo-WBL) started extended practice after a mean of 4.4 years. This was a reduction of 7 years compared to the baseline figure, and a reduction of 4 years compared to Geo-NMP. This would seem to support Ericsson *et al's* (2007) suggestion that using a constructivist approach could potentially expedite the development of more advanced skills because it focuses on setting learning goals that exceed the individual's current level of performance. However, it was not possible to confirm this statistically because the data was based on a multiple response set. Pharmacists who had done a doctorate programme (Geo-Doctorate) started extended practice after a mean of 12 years. This was similar to the baseline figure of 11.6 years for pharmacists who had undertaken unstructured learning only. This was not unexpected, as the majority of pharmacists doing doctorate programmes worked in academia and engaged in Advanced-service activities such as leadership, research and education (Geo-Advanced-service) rather than direct patient care activities.

As discussed in section 2.5, there are increasing pressures across the professions to ensure that the educational approaches used for CPD will enhance practice and thus improve outcomes for clients (Webster-Wright, 2009; Carraccio *et al*, 2016). In this study, enhanced practice for pharmacists was considered to be improved engagement in extended patient care activities, in accordance with current healthcare policy recommendations in Northern Ireland (Compton, 2011; Donaldson *et al*, 2014; Department of Health, Social Services and Public Safety, 2015). To try to ascertain what impact CPD had on extended practice in this study, the information displayed in Figures 5.13 and 5.14 was combined in Figure 5.15 to illustrate the percentage of pharmacists undertaking extended practice, and the time (mean number of years) for them to start extended practice for each educational approach ('type of learning' geocode). The six different symbols in Figure 5.15 represent the six different 'type of learning' geocodes.

Unstructured learning only (Geo-Unstructured) was considered to be the baseline educational approach in this study and is depicted by a black square symbol in Figure 5.15. Baseline figures for the percentage of pharmacists undertaking extended practice and the time to start extended practice of pharmacists were 32% and 11.6 years respectively. A higher percentage figure on the y axis coupled with a shorter

time on the x axis was considered to be improved engagement in extended patient care practice in comparison to the baseline.

Figure 5.15. Percentage of pharmacists undertaking extended practice and time to start extended practice by 'type of learning' geocode



The figures for semi-structured learning (Geo-Semi-structured) were approximately 41% and 13 years, and are depicted by a red triangle in Figure 5.15. Overall, this was not considered to be an improvement in engagement in extended patient care practice compared to the baseline. For structured postgraduate CE courses (Geo-CE) the figures were 32% and 13 years, and are shown as a green circle in Figure 5.15. Therefore, Geo-CE did not improve engagement in extended patient care activities in this study either. For the non-medical prescribing (NMP) course (Geo-NMP) the figures were 60% and 8.5 years, which was an improvement in comparison to the baseline. This is shown in Figure 5.15 as a pink diamond shape. An improvement was also seen for work-based learning (WBL) courses (Geo-WBL), which had figures of 48% and 4.4 years. This is shown in Figure 5.15 as a blue diamond shape. No improvement was seen for Geo-Doctorate, which had figures of approximately 14% and 12 years, and is depicted by an orange circle in Figure 5.15. Therefore, in this study only Geo-NMP and Geo-WBL were found to improve engagement in extended patient care activities, and thus to enhance pharmacy practice. These results are discussed in more detail in chapter 6.

5.3 Do pharmacists' attitudes towards CPD, pharmacy practice and their working environment impact on the CPD activities and professional practices that they engage in?

This section considers whether pharmacists' attitudes towards CPD, pharmacy practice and their working environment impacted on the CPD activities and professional practices they engaged in. Section 5.3.1 looks at pharmacists' attitudes towards CPD, section 5.3.2 looks at pharmacists' attitudes towards pharmacy practice, and section 5.3.3 looks at pharmacists' attitudes towards their working environment. Section 5.3.4 provides a summary of pharmacists' attitudes towards CPD, pharmacy practice and their working environment. Sections 5.3.5 and 5.3.6 go on to consider the influence of pharmacists' attitudes on the CPD activities and professional practices they engaged in respectively.

5.3.1 Pharmacists' attitudes towards CPD

Pharmacists were given 15 statements about their attitudes towards CPD based on different motivation scales and the educational literature, as discussed in section 4.5.3. They were asked to indicate their degree of agreement or disagreement with each statement on a five-point Likert scale (Bryman & Cramer, 2011). Factor analysis was then used to identify any themes that arose from the responses (Pallant, 2013), and to select the smallest number of factors that would adequately describe the data (Bryman & Cramer, 2011).

The 15 items were subjected to a Principal Components Analysis (PCA) using SPSS version 21. Prior to performing PCA, the suitability of data for factor analysis was assessed (Pallant, 2013). The Correlation Matrix (Appendix 10) revealed the presence of many coefficients of 0.3 and above, suggesting that factor analysis may be appropriate (Pallant, 2013). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value was 0.761. This was above the recommended value of 0.6, and Bartlett's Test of Sphericity reached statistical significance ($p < .001$), supporting the factorability of the correlation matrix (Pallant, 2013).

Principal Components Analysis (PCA) was used to extract the factors (or components) that can be used to best represent the interrelationships among this set of variables (Pallant, 2013). Factor analysis began by establishing the proportion of variance, or

communality, of each of the components (Blaikie, 2003; Bryman & Cramer, 2011). Appendix 11 shows the communalities of the components following PCA. Only components with an eigenvalue of 1 or more were considered for extraction (Pallant, 2013). As shown in Appendix 12, PCA revealed the presence of five components with an eigenvalue of 1 or more, explaining a total of 63.334% of the variance (Pallant, 2013). Acton *et al* (2009) have suggested using a combination of eigenvalues and the scree plot to come to a decision about the number of components to retain. The scree plot for pharmacists' attitudes towards CPD can be found in Appendix 13. The combination of eigenvalues and scree plot suggested it may be appropriate to retain three rather than five components in this case.

The Component Matrix in Appendix 14 shows the unrotated loadings of each of the items on the five components which had an eigenvalue of greater than one. Most of the items loaded quite strongly on the first three components, with only a few loading on components 4 and 5, adding further support for a three-component solution. The Structure Matrix in Appendix 15 shows the correlations between the items and the factors following Oblimin rotation. The Pattern Matrix in Appendix 16 shows the factor loadings; five items loaded above 0.3 on components 1, 2 and 3, and three items loaded above 0.3 on components 4 and 5. Twelve of the 15 items loaded onto components 1, 2 and 3, with substantial loadings on only one component. Therefore, it was decided to use three components rather than five components to describe pharmacists' attitudes towards CPD. Appendix 12 shows that these three components explained a total of 47.625% of the variance, with components 1, 2 and 3 contributing 23.984%, 13.716% and 9.925% respectively

The three factors (or components) were then defined (Acton *et al*, 2009). Motivation scale terminology was used to define the factors as follows:

Factor 1 – Mastery (preference for hard tasks to develop competence).

This is analogous to intrinsic motivation where activities are pursued out of a sense of satisfaction (Fairchild *et al*, 2005).

Factor 2 – Effort (happy to expend effort on completing tasks).

This is the opposite of amotivation where there is an absence of drive to expend effort on completing tasks (Fairchild *et al*, 2005).

Factor 3 – Performance (preoccupation with demonstrating competence to others).

This is analogous to extrinsic motivation where activities are pursued out of a sense of obligation (Fairchild *et al*, 2005).

Cronbach's alpha was then used to check the reliability of these factors (Pallant, 2013). As recommended by Pallant (2013), all negatively worded items in the scale were reverse coded to maintain internal consistency. The Cronbach alpha values for each of the three factors are summarised in table 5.25. Diagnostic tables for the three factors (Mastery, Effort and Performance) can be found in Appendices 17, 18 and 19 respectively.

Table 5.25. Summary of the factors and items describing pharmacists' attitudes towards CPD

Factor	**Attitudes towards CPD**	**Cronbach alpha**
Mastery	I like to participate in real life tasks in the workplace I like to discuss issues and scenarios with fellow professionals I like to learn about changes or new situations I have encountered in my practice I like difficult activities that challenge me to learn new things I like to have a goal to work towards	0.746
Effort	I like difficult activities that challenge me to learn new things I like learning activities that can be completed in a short space of time – *reverse coded* I like learning activities that are easy and require little work - *reverse coded* I don't mind activities that take a long time to complete if I know that eventually I will learn a lot I am happy just to pass a learning activity; if I get a high mark, that is an added bonus - *reverse coded*	0.615 *(not acceptable to use)*
Performance	I like to do well and get high marks I don't like getting things wrong and try not to make mistakes when I'm learning I like to get a certificate or credits when I complete a learning activity I like to have a goal to work towards I am happy just to pass a learning activity; if I get a high mark, that is an added bonus - *reverse coded*	0.681 *(increased to 0.718 when last item was deleted)*

Cronbach alpha values above 0.7 are considered to be acceptable (Pallant, 2013). Factor 1 (Mastery) had a Cronbach alpha value of 0.746, and was thus deemed acceptable. The Cronbach alpha coefficient for factor 2 (Effort) was 0.615. This value was not increased by removing any of the items loaded onto this component, and thus it was decided not to keep this factor. Factor 3 (Performance) had a Cronbach alpha

coefficient of 0.681 which was increased to 0.718 by removing the last item ('I am happy just to pass a learning activity; if I get a high mark, that is an added bonus'). It was decided to remove this last item and to keep this factor. Therefore, two new variables were created (Acton *et al*, 2009) which described pharmacists' attitudes towards CPD: Mastery and Performance.

5.3.2 Pharmacists' attitudes towards pharmacy practice

Pharmacists were asked eight questions on their attitudes towards pharmacy practice. These statements related to their views on extending the roles of pharmacists and other members of the pharmacy team, and were based on themes identified in a previous study regarding the potential future roles of pharmacy staff (Braund *et al*, 2012). They were asked to indicate their degree of agreement or disagreement with each statement on a five-point Likert scale (Bryman & Cramer, 2011). Factor analysis was used again to identify any themes arising from their responses (Pallant, 2013), and to select the smallest number of factors that would adequately describe the data (Bryman & Cramer, 2011).

The Correlation Matrix (Appendix 20) showed a number of correlation coefficients of 0.3 and above. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value of 0.692 was above 0.6, and the Bartlett's Test of Sphericity was significant ($p < .001$), suggesting it was appropriate to undertake factor analysis (Pallant, 2013). Principal Components Analysis (PCA) was again used to extract components. Communalities are shown in Appendix 21. Three components had an eigenvalue of 1 or more, explaining a total of 70.948% of the variance (Pallant, 2013), as shown in Appendix 22. The scree plot supported retaining three components (Appendix 23).

The Component Matrix in Appendix 24 shows the unrotated loadings of each of the items on these three components. The Structure Matrix in Appendix 25 shows the correlations between the items and the factors following Oblimin rotation. The Pattern Matrix in Appendix 26 shows a number of strong loadings for all three components with 7 of the 8 variables loading substantially on only one component.

The three factors (or components) were then defined as follows:

Factor 1 - Improve skill mix (the roles of the different pharmacy team members could be improved)
Factor 2 - Maintain current roles (members of the pharmacy team should maintain their current roles)
Factor 3 - Extend roles (members of the pharmacy team should take on additional roles)

Cronbach's alpha was used again to check the reliability of these factors, following reverse coding of the negatively worded items in the scale (Pallant, 2013). The Cronbach alpha values for each of the three factors are summarised in table 5.26. Diagnostic tables for the three factors (Improve skill mix, Maintain current roles and Extend roles) can be found in Appendices 27, 28 and 29 respectively.

Table 5.26. Summary of the factors and items describing pharmacists' attitudes towards pharmacy practice

Factor	**Attitudes towards pharmacy practice**	**Cronbach alpha**
Improve skill mix	Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists Some of the roles that pharmacists currently do should be done by appropriately trained pharmacy technicians Some of the roles that pharmacy technicians currently do should be done by appropriately trained pharmacy assistants Pharmacy technicians should not take on any additional roles - *reverse coded*	0.784
Maintain current roles	Pharmacists should maintain their current roles Pharmacy technicians should maintain their current roles	0.760
Extend roles	Pharmacy technicians should not take on any additional roles - *reverse coded* Pharmacists should not take on any additional roles - *reverse coded* Pharmacists should take on some additional roles that were traditionally done by doctors	0.671 *(not acceptable to use)*

Factors 1 (Improve skill mix) and 2 (Maintain current roles) had Cronbach alpha values of above 0.7 and were considered to be acceptable (Pallant, 2013). Pallant (2013) suggests that, ideally, there should be three or more items loading on each component, but this was not the case for factor 2. The Cronbach alpha coefficient for factor 3 (Extend roles) was 0.671, so it was decided to remove this component. Therefore, two

new variables were created (Acton *et al*, 2009) which described pharmacists' attitudes towards pharmacy practice: Improve skill mix and Maintain current roles.

5.3.3 Pharmacists' attitudes towards their working environment

Pharmacists were asked six questions on their attitudes towards their working environment, based on whether they considered it to be "expansive" or "restrictive" (Fuller & Unwin, 2004a, p. 127). They were asked to indicate their degree of agreement or disagreement with each statement on a five-point Likert scale (Bryman & Cramer, 2011). Since the statements had already been defined as to whether they related to an expansive or restrictive environment, as described by Fuller and Unwin (2004a), factor analysis was not used because the themes had already been identified. However, Cronbach's alpha was still used to check the internal consistency of the scale that had been constructed (Pallant, 2013). The Cronbach alpha values for the two factors (Expansive environment and Restrictive environment) are shown in table 5.27. Diagnostic tables for these two factors can be found in Appendices 30 and 31 respectively.

Table 5.27. Summary of the factors and items describing pharmacists' attitudes towards their working environment

Factor	Attitudes towards working environment	Cronbach alpha
Expansive environment	A high value is placed on developing all staff Staff development focuses on helping individuals to progress in their career Staff have access to a broad range of experiences relating to the service as a whole	0.786
Restrictive environment	Service provision takes priority over staff development Staff development focuses on helping individuals to do their current job Staff have access to a narrow range of experiences relating mainly to their current job	0.123 *(not acceptable to use)*

Factor 1 (Expansive environment) had a Cronbach alpha value of above 0.7 and was thus considered to be acceptable (Pallant, 2013). However, the Cronbach alpha coefficient for factor 2 (Restrictive environment) was only 0.123, meaning it was not acceptable to use. Therefore, only one new variable was created (Acton *et al*, 2009) to describe pharmacists' attitudes towards their working environment: Expansive environment.

5.3.4 Summary of pharmacists' attitudes towards CPD, pharmacy practice and their working environment

This gave a total of five new variables which described pharmacists' attitudes towards CPD, pharmacy practice and their working environment in this study: Mastery, Performance, Improve skill mix, Maintain current roles and Expansive environment. A summary of these variables is given in table 5.28.

Table 5.28. Summary of the five new variables describing pharmacists' attitudes towards CPD, pharmacy practice and their working environment

Variable	Pharmacists' attitudes	Cronbach alpha
Mastery *(CPD)*	I like to participate in real life tasks in the workplace I like to discuss issues and scenarios with fellow professionals I like to learn about changes or new situations I have encountered in my practice I like difficult activities that challenge me to learn new things I like to have a goal to work towards	0.746
Performance *(CPD)*	I like to do well and get high marks I don't like getting things wrong and try not to make mistakes when I'm learning I like to get a certificate or credits when I complete a learning activity I like to have a goal to work towards	0.718
Improve skill mix *(Pharmacy practice)*	Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists Some of the roles that pharmacists currently do should be done by appropriately trained pharmacy technicians Some of the roles that pharmacy technicians currently do should be done by appropriately trained pharmacy assistants Pharmacy technicians should not take on any additional roles - *reverse coded*	0.784
Maintain current roles *(Pharmacy practice)*	Pharmacists should maintain their current roles Pharmacy technicians should maintain their current roles	0.760
Expansive environment *(Working environment)*	A high value is placed on developing all staff Staff development focuses on helping individuals to progress in their career Staff have access to a broad range of experiences relating to the service as a whole	0.786

These five new variables were then used in sections 5.3.5 and 5.3.6 to consider the impact of pharmacists' attitudes on the CPD activities and professional practices they engaged in.

5.3.5 Impact of pharmacists' attitudes on the CPD activities they engaged in

The five new variables describing pharmacists' attitudes were the independent variables and, although the Likert scale is ordinal, it was treated as though it was an interval scale as discussed earlier (Blaikie, 2003; Bryman & Cramer, 2011). The 'type of learning' geocode was the dependent variable describing CPD activities. The 'type of learning' geocode was nominal with more than two categories, and thus multinomial logistic regression was used to determine the impact of the independent variables on the dependent variable (Pallant, 2013; Acton *et al*, 2009). Full details can be found in Appendix 32. The 'Model Fitting Information' in Appendix 32 indicates that the model produced a significant fit to the data. The 'Likelihood Ratio Tests' indicate that three of the five independent variables (Mastery, Maintain current roles, and Expansive environment) had a significant impact on the CPD activities that pharmacists engaged in. The Parameter Estimates show that having a 'Mastery' approach to CPD reduced the likelihood of a pharmacist doing unstructured learning only (Geo-unstructured) ($p = .013$, with a Wald coefficient of 6.123). The larger the Wald value, the more significant the variable (Acton *et al*, 2009). In a 'Mastery' approach, individuals have a preference for doing challenging tasks to develop their competence. This could imply that pharmacists viewed doing unstructured learning as an easier option than doing more structured forms of learning. Conversely, having a 'Maintain current roles' view of pharmacy practice made it more likely for a pharmacist to do unstructured learning only (Geo-unstructured) ($p = .000$, with a Wald coefficient of 13.155). This was the largest Wald value, making this variable the most significant (Acton *et al*, 2009). Pharmacists with a 'Maintain current roles' view of pharmacy practice were also more likely to do structured CE learning (Geo-CE) ($p = .027$; Wald coefficient = 4.901). Rather surprisingly, the likelihood of a pharmacist doing structured CE learning (Geo-CE) was reduced by working in an 'Expansive environment' ($p = .049$; Wald coefficient = 3.887). Working in an 'Expansive environment' also reduced the likelihood of a pharmacist doing both non-medical prescribing (Geo-NMP) ($p = .011$; Wald coefficient = 6.429) and work-based learning (Geo-WBL) ($p = .028$; Wald coefficient = 4.848) which, again, was surprising. There were no other significant results. The results which were found to be significant ($p < .05$) are summarised in table 5.29.

Table 5.29. Summary: impact of pharmacists' attitudes on the CPD activities they engaged in

Attitudes		Impact on CPD activities	Wald	Sig level
CPD	Mastery	↓ Geo-unstructured	6.123	.013
Pharmacy practice	Maintain current roles	↑ Geo-unstructured ↑ Geo-CE	13.155 4.901	.000 .027
Working environment	Expansive environment	↓ Geo-NMP ↓ Geo-WBL ↓ Geo-CE	6.429 4.848 3.887	.011 .028 .049

As the results for working in an 'Expansive environment' were unexpected, it was decided to explore this further by looking at pharmacists' attitudes towards their working environment based on their main sector of work. This was done by considering the three 'Expansive environment' statements listed in Table 5.28. One-way ANOVA tests revealed no significant differences in the mean scores for the first 'Expansive environment' statement 'Staff have access to a broad range of experiences relating to the service as a whole' which were < 4 for all sectors. However, significant differences were found for the remaining two 'Expansive environment' statements ('A high value is placed on developing all staff' and 'Staff development focuses on helping individuals to progress in their career'). The mean scores and significance levels for these two statements are given in table 5.30.

Table 5.30. Pharmacists' attitudes towards their working environment based on their main sector of work

Attitudes	Main sector of work	Mean	SD	Sig level
A high value is placed on developing all staff (N = 372)	Community Hospital Primary care Academia Industry Other	3.6961 3.4741 3.3500 4.5294 3.5000 3.7059	1.07053 1.09155 .93330 .62426 2.12132 .77174	.004
Staff development focuses on helping individuals to progress in their career (N = 370)	Community Hospital Primary care Academia Industry Other	3.3371 3.0441 3.0500 3.9412 3.5000 3.1176	1.05170 1.03185 .99868 .65865 .70711 .78121	.008

Post-hoc comparisons using the Scheffé test (Bryman & Cramer, 2011; Pallant, 2013) found differences between pharmacists working in academia and those working in both the hospital and primary care sectors for the statement 'A high value is placed on

developing all staff'. Full details can be found in Appendix 33. Indeed, only those pharmacists working in academia had a mean score of > 4 for this statement. Differences were also found between pharmacists working in academia and the hospital sector for the statement 'Staff development focuses on helping individuals to progress in their career'. Full details can be found in Appendix 34. Again, the highest mean score of 3.9412 (ie almost 4) for this statement was seen in pharmacists working in academia. These results would seem to suggest that only those in academia thought they worked in an 'Expansive environment'. The majority of pharmacists in academia do a doctorate and, as found in the geocoding process, very few pharmacists who had done a doctorate had done any other type of structured learning (Geo-CE, Geo-WBL or Geo-NMP). Therefore, the results obtained for the impact of working in an 'Expansive environment' on the CPD activities that pharmacists engaged in could be an anomaly because only those in academia thought they worked in an 'Expansive environment' and they are unlikely to have done Geo-CE, Geo-WBL or Geo-NMP. Thus it was decided to exclude this finding from the analysis.

5.3.6 Impact of pharmacists' attitudes on the professional practices they engaged in

The five independent variables (Mastery, Performance, Improve skill mix, Maintain current roles and Expansive environment) were also used to consider the impact of pharmacists' attitudes towards CPD, pharmacy practice and their working environment on the professional practices they engaged in ('type of professional activity' geocode). Multinomial logistic regression was used again because the dependent variable ('type of professional activity' geocode) was nominal with more than two categories (Pallant, 2013; Acton *et al*, 2009). Full details can be found in Appendix 35. The 'Model Fitting Information' indicates that the model produced a significant fit to the data. The 'Likelihood Ratio Tests' indicate that the Mastery variable had a significant impact on the professional practices that pharmacists engaged in, with the Maintain current roles variable having a significance value of p = .071. The Parameter Estimates show that having a 'Mastery' approach to CPD reduced the likelihood of a pharmacist doing semi-professional activities only (Geo-Semi-professional) (p = .005, with a Wald coefficient of 7.770). As discussed earlier, pharmacists with a 'Mastery' approach to CPD were intrinsically motivated and had a preference for undertaking challenging learning activities to develop their competence. This finding suggests that they may also have a

preference for engaging in more challenging professional activities in the workplace. Having a 'Maintain current roles' view of pharmacy practice made it more likely for a pharmacist to do essential activities that must be carried out by a pharmacist (Geo-Professional-pharmacist) (p = .003; Wald coefficient = 8.614). This could be because these pharmacists are satisfied performing these essential activities (Braund *et al*, 2012) and are happy to "hold on to the security offered by the mastery of their present duties and cannot fathom what it would mean to step outside this comfort zone" (Rosenthal *et al*, 2010, p. 40). There were no other significant results.

As the focus of this study was on extended practice, the impact of pharmacists' attitudes towards CPD, pharmacy practice and their working environment on whether or not they engaged in extended practice ('some or no extended practice' geocode) was also considered. Binary logistic regression was used in this case because the dependent variable was nominal with two categories ('some extended practice' or 'no extended practice') (Pallant, 2013; Acton *et al*, 2009). Full details can be found in Appendix 36. The model containing the five independent variables (Mastery, Performance, Improve skill mix, Maintain current roles and Expansive environment) was statistically significant (p = .002, Chi-Square = 19.213, df = 5) indicating that it was able to distinguish between respondents who undertook some extended practice and those who undertook no extended practice. A Chi square test value of 7.790 with a significance level of .454 in the Hosmer-Lemeshow Test indicated further support for this model (Pallant, 2013). Having an 'Improve skill mix' view of pharmacy practice increased the likelihood of a pharmacist doing some extended practice (p = .018; Wald coefficient = 5.599). The likelihood was reduced by having a 'Maintain current roles' view (p = .034; Wald coefficient = 4.480). There were no other significant results.

A summary of the impact of pharmacists' attitudes on the professional practices they engaged in ('type of professional activity' and 'some or no extended practice' geocodes) is given in table 5.31.

Table 5.31. Summary: impact of pharmacists' attitudes on the professional practices they engaged in

Attitudes		Impact on pharmacy practice	Wald	Sig level
CPD	Mastery	↓ Geo-Semi-professional	7.770	.005
Pharmacy practice	Improve skill mix	↑ Some extended practice	5.599	.018
	Maintain current roles	↑ Geo-Professional-pharmacist ↓ Some extended practice	8.614 4.480	.003 .034

5.3.7 Summary of the impact of pharmacists' attitudes on the CPD activities and professional practices they engaged in

Pharmacists' attitudes towards CPD and pharmacy practice appeared to have an impact on both the CPD activities and professional practices that they engaged in, as summarised in table 5.32. Their attitudes towards their working environment did not seem to have an impact in this study, although only those pharmacists working in academia appeared to think that they worked in an 'Expansive environment'.

Table 5.32. Summary: impact of pharmacists' attitudes on the CPD activities and professional practices they engaged in

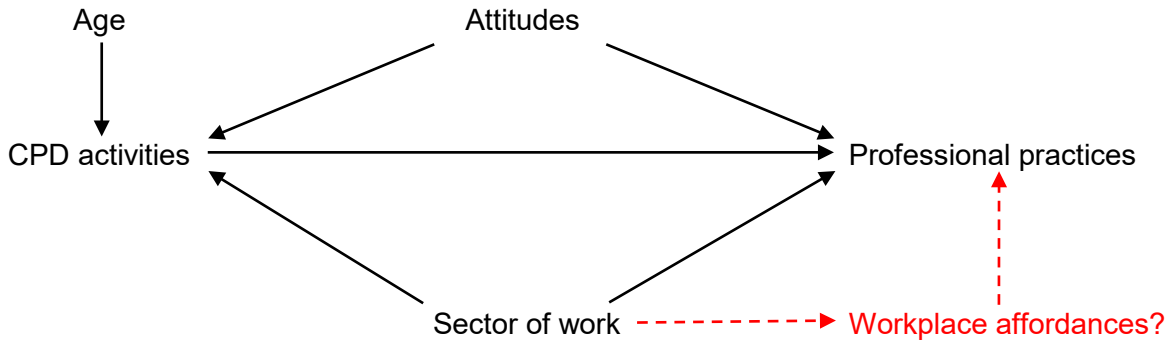
Attitudes		Impact on CPD activities *(CPD)* and pharmacy practice *(PP)*	Wald	Sig level
CPD	Mastery	↓ Geo-Semi-professional *(PP)* ↓ Geo-unstructured *(CPD)*	7.770 6.123	.005 .013
Pharmacy practice	Improve skill mix	↑ Some extended practice *(PP)*	5.599	.018
	Maintain current roles	↑ Geo-unstructured *(CPD)* ↑ Geo-Professional-pharmacist *(PP)* ↑ Geo-CE *(CPD)* ↓ Some extended practice *(PP)*	13.155 8.614 4.901 4.480	.000 .003 .027 .034

5.4 Factors influencing professional practices

The factors in this study that were found to influence the professional practices that pharmacists engaged in are summarised in Figure 5.16. The CPD activities that pharmacists undertook influenced the professional practices they engaged in, and this is illustrated in the centre of the diagram by a solid black arrow. Only pharmacists who had undertaken the non-medical prescribing course (Geo-NMP) or a structured work-based learning course (Geo-WBL) improved their engagement in extended patient care activities compared to the baseline educational approach (Geo-Unstructured).

Therefore, only Geo-NMP and Geo-WBL were considered to enhance pharmacy practice in this study.

Figure 5.16. Summary of the factors influencing professional practices



Pharmacists' attitudes towards CPD and pharmacy practice, but not their working environment, were also found to impact on both the professional practices and the CPD activities they engaged in. Again, this is illustrated by solid black arrows. Having an 'Improve skill mix' view of pharmacy practice increased the likelihood of doing some extended practice, whilst the likelihood was reduced by having a 'Maintain current roles' view. This could support Billett's (2002) suggestion that individuals can elect to engage in workplace practices. Having a 'Maintain current roles' view also made it more likely for a pharmacist to do both a traditional continuing education (CE) course, and unstructured learning only, both of which focus mainly on maintaining the status quo. Conversely, the likelihood of doing unstructured learning only was reduced by having a 'Mastery' approach towards CPD. In addition, having a 'Mastery' approach made it less likely for a pharmacist to do Semi-professional activities only. Pharmacists with a 'Mastery' approach in this study were thought to be intrinsically motivated with a preference for undertaking challenging learning and professional activities. This further supports Billett's (2002) view that engagement in professional practices in the workplace can be elective.

Although pharmacists' attitudes towards their working environment did not influence the CPD activities and professional practices they engaged in, their sector of work did. This is also depicted by solid black arrows in Figure 5.16. The majority of community pharmacists (65%) undertook semi-structured learning, whereas pharmacists in

hospital and primary care had a wider spread of CPD activities. The majority of pharmacists in academia did a doctorate programme. The proportions of pharmacists engaged in some extended patient care services in community, hospital, primary care and academia were 45%, 38%, 61.5% and 8% respectively. These results do seem to suggest that respondents were not still entrenched in traditional dispensing activities, and that their roles were starting to shift towards extended patient care practice. Nevertheless, although some progress may have been made since the previous studies were undertaken, if patients are to benefit, then the majority of pharmacists need to be routinely providing these services (Jubraj, 2011). As discussed earlier, although pharmacists' attitudes towards their working environment did not appear to have an impact in this study, only those pharmacists working in academia thought they worked in an 'Expansive environment'. This result was unexpected, and could imply that pharmacists working in other sectors (community, hospital and primary care) felt they lacked the opportunity and support to implement extended practice in the workplace. It is possible that this combination of opportunity and support, or "workplace affordances" (Billett, 2004, p. 114), could have had an influence on the professional practices undertaken; however this was not explored in this study. Therefore, workplace affordances have been illustrated using red dashed arrows in Figure 5.16, due to the uncertainty regarding their impact. If workplace affordances do have an impact on professional practices, then the results of this study suggest that they would have a "co-participative" relationship with how individuals elected to engage in them (Billett, 2002, p. 466).

Age also had an impact on CPD activities, but not professional practices, with younger pharmacists doing a higher proportion of work-based learning (WBL) courses, and older pharmacists doing a higher proportion of traditional continuing education (CE) courses. This was probably because the former have only been available in Northern Ireland since 2008. This is depicted by a solid black arrow in Figure 5.16.

5.5 Conclusion

This study found that the professional activities that pharmacists undertook in practice were influenced by the CPD activities they had engaged in. Pharmacists who undertook unstructured learning only had the highest incidence of engagement in semi-

professional activities that can be performed by any member of the pharmacy team. Indeed, approximately 28% of these pharmacists engaged solely in activities that do not need to be performed by a pharmacist. A slightly higher proportion (32%) undertook some extended patient care practice. Those pharmacists who also undertook semi-structured learning had a lower incidence of engagement in activities that do not need to be performed by a pharmacist (approximately 20%) and a higher proportion engaging in some extended practice (approximately 41%). 12% of pharmacists who had done a traditional continuing education (CE) postgraduate degree course (Geo-CE) undertook solely activities that do not need to be performed by a pharmacist. However, the proportion undertaking some extended practice was the same as for unstructured learning only (32%). Only 2% of pharmacists who had done the non-medical prescribing (NMP) course (Geo-NMP) did solely activities that do not need to be performed by a pharmacist. This group had the highest engagement in extended patient care practice at approximately 60%. Nevertheless, it was anticipated that this proportion would have been higher, as approximately 40% of this group said they were not prescribing as part of their routine practice. This could possibly have been due to a lack of opportunity and support in the workplace (workplace affordances), and whether pharmacists were electing to prescribe (Billett, 2002). However, as the reasons for this were not explored in this study, this can only be speculative. 8% of pharmacists who had done work-based learning (Geo-WBL) undertook solely activities that do not need to be performed by a pharmacist, and 48% engaged in some extended practice. This type of learning reduced the mean number of years to start extended practice. However, it was not possible to confirm statistically whether undertaking WBL expedited extended practice. The majority of pharmacists who had undertaken a doctorate were engaged in advanced professional activities such as research and education rather than patient care activities. Only Geo-NMP and Geo-WBL were found to improve engagement in extended patient care activities in this study, and thus to enhance pharmacy practice. Because the type of CPD activity undertaken can have an impact on professional practice, it could potentially be influenced, for example by introducing policies which promote the use of particular educational approaches for CPD, in order to increase engagement in extended patient care practice. This is discussed in more detail in chapters 6 and 7.

Pharmacists' attitudes towards CPD and pharmacy practice were found to impact on both the professional practices they engaged in and the CPD activities they undertook. Pharmacists with a 'Mastery' approach to CPD were considered to be intrinsically motivated, and were found to have a preference for undertaking challenging learning and professional activities. Pharmacists with an 'Improve skill mix' view of pharmacy practice were more likely to engage in extended practice, whilst those with a 'Maintain current roles' view were less likely. Having the latter view also increased the likelihood of undertaking a traditional continuing education (CE) course and unstructured learning only, both of which focus mainly on maintaining the status quo. This supports the suggestion that engagement in professional practices can be elective (Billett, 2002).

A pharmacist's sector of work also influenced the CPD activities and professional practices they engaged in. Interestingly, only pharmacists working in academia thought they worked in an 'Expansive environment', implying that workplace affordances (Billett, 2004) may have an impact on professional practices. The results of this study suggest that workplace affordances are likely to have a "co-participative" relationship with how individuals elect to engage with professional practices in the workplace (Billett, 2002, p. 466). This was not examined in this study, and would warrant further exploration if extended patient care practice is to be implemented more widely.

CHAPTER 6: DISCUSSION: IMPLICATIONS FOR CPD

6.1 Introduction

This chapter discusses the implications of the findings of this study for the educational approaches for pharmacists' continuing professional development (CPD). Although some authors have cautioned against using a particular educational approach for professional learning (Watkins & Marsick, 1992; Chivers, 2010), there are increasing pressures across the professions to ensure that the educational approaches used for CPD will enhance practice and thus improve outcomes for clients (Webster-Wright, 2009; Carraccio *et al*, 2016). As discussed in section 5.2.3, in this study, enhanced practice for pharmacists was taken to be improved engagement in extended patient care activities.

6.2 Implications for the educational approaches for pharmacists' CPD

Unstructured learning is the minimum CPD requirement stipulated by the pharmacy regulator in Northern Ireland (Pharmaceutical Society of Northern Ireland, 2014), and was thus taken to be the baseline educational approach in this study. Pharmacists can choose what they learn and how they learn it. Therefore unstructured learning for pharmacists is also self-directed learning. Some learners undertaking self-directed learning can find it difficult to advocate effectively for their own development (Hartree, 1984; Sadler-Smith *et al*, 2000; Bryson *et al*, 2006). In practice this can often result in people choosing topics and learning methods that are familiar to them (Norman, 1999). A reliance on unstructured learning can lead to a reactive rather than a proactive approach to professional development (Watkins & Marsick, 1992; Daniels, 2001; Eraut, 2004a). This is because, with unstructured learning, there is no formal learning curriculum (Lave & Wenger, 2002). Some pharmacists have found this lack of a formal curriculum to be a barrier to their learning (Noble & Hassell, 2008). Nevertheless, in this study, high levels of agreement (83.6%) were seen with the statement 'I enjoy this type of learning' for unstructured learning. Almost 40% of the pharmacists in this study who only undertook unstructured learning for their CPD (Geo-Unstructured) spent most of their time undertaking semi-professional activities that could be performed by any member of pharmacy staff. Indeed, the majority of these pharmacists (approximately three quarters) spent most of their time undertaking activities that do not need to be

performed by a pharmacist. In addition, approximately 28% undertook solely professional activities that do not need to be performed by a pharmacist. This reflects the picture seen in the previous studies conducted by Bell *et al* (1999), McCann *et al* (2010) and Davies *et al* (2014), suggesting that pharmacists who rely solely on unstructured learning for their CPD are still entrenched in traditional dispensing roles that can be performed by any member of the pharmacy team. This would seem to suggest that undertaking unstructured learning only results predominantly in the maintenance of current practice. Indeed, pharmacists in this study who had a 'Maintain current roles' view of professional practice were more likely to have undertaken unstructured learning only. With regard to maintaining current roles, Braund *et al* (2012) have found that many community pharmacists in New Zealand were satisfied with their current role, which they saw as mainly dispensing; and their interest in CPD was related to performing their current role rather than furthering their scope of practice. They have concluded that this could present barriers for future change (Braund *et al*, 2012). The findings of this study would suggest that these barriers to change could also be present in Northern Ireland. One possible solution to overcoming these barriers could be to implement policies that promote more structured forms of learning for CPD. With regard to extended patient care activities, approximately 32% of pharmacists who undertook unstructured learning only did some extended practice, and the mean number of years post-registration to start extended practice was 11.6 years. These were taken to be the baseline figures. A higher proportion than 32% coupled with a shorter time than 11.6 years was considered to be an improvement in participation in extended patient care practice in comparison to the baseline.

Norman (1999) has recommended using more structured forms of learning for professional practice. The largest proportion of pharmacists in this study (36%) had done a combination of semi-structured and unstructured learning for their CPD activities (Geo-Semi-structured). However, the majority of these pharmacists (almost 80%) spent most of their time doing activities that did not need to be performed by a pharmacist, which was similar to the baseline figure for Geo-Unstructured. Nevertheless, the figure for doing solely activities that do not need to be performed by a pharmacist was almost 10% lower than the baseline figure. Likewise, the figure for doing some extended practice was almost 10% higher than the baseline. This would suggest that the addition of semi-structured learning conferred some improvement in professional practice over unstructured learning alone. The contents of the semi-

structured courses focus on the delivery of specific extended patient care services. Therefore, it was anticipated that undertaking these courses would have had a greater impact on professional practice, particularly as many of the pharmacists did these semi-structured courses to meet the requirements stipulated by their employer. However, approximately 60% of these pharmacists undertook no extended patient care activities, and thus did not appear to be applying their learning in their routine practice. Although the reasons for this were not explored in this study, one possibility could be the use of a cognitive educational approach in the semi-structured courses. In this approach, abstract knowledge is acquired prior to practice and may not necessarily be applied routinely in the workplace (Boud & Hager, 2012; Sfard, 1998; Hager & Butler, 1996). The mean number of years to start extended practice for pharmacists who had done semi-structured learning was 13 years, which was longer than the baseline figure. Again, the reasons for this delay were not explored. However, in the cognitive educational approach development precedes learning (Merriam *et al*, 2007), and it is assumed that the individual needs to have developed to a certain level of maturity before they are ready to learn at that level (Swenson, 1980). It could have been that these pharmacists waited until they felt ready to undertake extended patient care activities before undertaking the semi-structured course. This could potentially explain the additional 1.4 years over and above the baseline figure. Thus a mixed picture was seen with regard to extended practice. Semi-structured learning did increase the proportion of pharmacists undertaking extended patient care activities (but not to the extent expected), but it also delayed the mean number of years to start extended practice. Therefore, it cannot be concluded that there was an improvement in participation in extended patient care practice with semi-structured learning in comparison to the baseline.

A cognitive educational approach is also used in the structured postgraduate continuing education (CE) courses. Approximately a third (32%) of pharmacists who had done a CE course (Geo-CE) spent most of their time doing activities that did not need to be performed by a pharmacist. In addition, 12% of these pharmacists undertook solely activities that do not need to be performed by a pharmacist. These figures are both less than half of their corresponding baseline figures, and also lower than the figures for semi-structured learning. This could add support to Norman's (1999) suggestion that more structured forms of learning should be used for professional practice. However, only 32% of pharmacists who had done a structured

postgraduate CE course did some extended practice, which was the same as the baseline figure for pharmacists who had done unstructured learning only. Interestingly, the mean number of years to start extended practice for Geo-CE was 13 years; this was exactly the same as the figure for Geo-Semi-structured, and was longer than the baseline figure. So, despite being structured, postgraduate continuing education (CE) courses had no impact on the proportion of pharmacists undertaking extended patient care activities, and delayed the mean number of years to start extended practice. This may be because theory is acquired prior to practice in the cognitive educational approach (Hager & Butler, 1996). Rosenthal *et al* (2010, p. 40) have noted that this approach has traditionally been used for pharmacists' education, which is scientific in nature and "emphasizes facts and details over the application of knowledge". However, Zorek *et al* (2010, p. 1) have suggested that this approach can promote "bulimic learning" which is not conducive to the long-term retention of knowledge and skills necessary to competently practise pharmacy. The findings of this study do seem to lend support to concerns that the abstract knowledge learnt in cognitivism is not applied routinely in the workplace (Boud & Hager, 2012). It was also found that having a 'Maintain current roles' view of professional practice increased the likelihood of pharmacists having undertaken Geo-CE. This would also support the suggestion that using a cognitive approach in education preserves the status quo (Merriam *et al*, 2007; Houle, 1980). However, preserving the status quo is not a viable option for the healthcare system in Northern Ireland (Compton, 2011). The future model for healthcare in Northern Ireland proposes an expanded patient care role for pharmacists (Compton, 2011). This proposal is supported by Donaldson *et al* (2014, p. 39) who warn that "those who resist change or campaign for the status quo are perpetuating an ossified model of care that acts against the interests of patients and denies many 21st Century standards of care". Indeed, in this study pharmacists with a 'Maintain current roles' view were less likely to have undertaken some extended practice. Cognitivism has been used in formal educational systems for many years, and is viewed as the "standard paradigm of learning" (Hager, 2004, p. 243). Rosenthal *et al* (2010) have suggested that pharmacists are more comfortable with this approach which deals with abstract concepts than they are with applying their knowledge through interactions with patients. However, as highlighted in section 2.2, it is essential for the educational approach used for pharmacists' CPD to evolve to ensure it supports extended practice "rather than that inscribed in earlier times" (Boud & Hager, 2012, p. 27).

The contents of the non-medical prescribing (NMP) course focus on the delivery of a specific extended patient care service; that is non-medical prescribing. In the UK, approximately 85% of qualified pharmacist prescribers routinely undertake this specific extended patient care activity (Bourne *et al*, 2016). For this reason, it was envisaged that the majority of pharmacists in this study who had undertaken the NMP course (Geo-NMP) would be engaged in extended practice. Indeed, approximately 60% of pharmacists who had completed the NMP course undertook some extended patient care activities, which was almost 30% higher than baseline and the highest proportion for all the 'types of learning' geocodes. In addition, the mean number of years to start extended practice for pharmacists who had done the NMP course was 8.5 years, which was approximately 3 years less than the baseline figure. This was considered to be an improvement in participation in extended patient care practice in comparison to the baseline. As discussed above, the contents of the semi-structured courses also focus on the delivery of specific extended patient care services. However, Geo-NMP had a higher percentage figure on the y axis in Figure 5.15 and a shorter time on the x axis compared to Geo-Semi-structured learning. As well as being more structured than the semi-structured courses, the educational approach used in the NMP course is also different. The NMP course uses a hybrid CE / work-based learning (WBL) approach rather than a purely cognitive educational approach. It is possible that this use of WBL led to a greater application of learning in practice. Nonetheless, 8.5 years is a long time to wait to start to provide extended patient care activities; and approximately 40% of pharmacists who had completed the NMP course were not using their prescribing qualification in their routine practice, which was approximately 25% higher than the figure quoted for the whole of the UK (Bourne *et al*, 2016). In addition, a third (33%) of pharmacists who had done the NMP course spent most of their time doing activities that did not need to be performed by a pharmacist, which was the same proportion as those who had done CE courses. Thus, although some improvement was seen, it was not to the extent anticipated. The reasons for this were not explored in this study, but could relate to workplace affordances, or whether or not pharmacists elected to prescribe in practice (Billett, 2002). Interestingly, Rosenthal *et al* (2010) have indicated that, in relation to pharmacist prescribing, the latter reason would be more likely than the former. This is because they believe that, as a profession, pharmacists lack confidence, fear new responsibility and are risk-averse, and this makes them resistant to change (Rosenthal *et al*, 2010). In this study, having a 'Maintain current roles' view of pharmacy practice was found to increase the likelihood of doing essential activities

that must be carried out by a pharmacist, and to reduce the likelihood of doing some extended practice, which would seem to support the belief that some pharmacists are resistant to change. In this study, however, pharmacists indicated that they felt confident undertaking all categories of professional activity, including extended patient care activities. Nonetheless, it is acknowledged that this data was obtained from pharmacists who were already routinely undertaking those professional activities; data from those who were not applying their learning in practice was not collected.

The contents of the structured work-based learning (WBL) courses have a general focus on medicines optimisation, although the Advanced Pharmacy Practice Diploma/MSc programme also incorporates the non-medical prescribing qualification. The WBL courses use a constructivist educational approach where the individual learns by actively engaging in social practices (Merriam *et al*, 2007; Pritchard & Woollard, 2010). In addition, a structured pathway of activities in a practice setting is used, as recommended by Billett (2011). In this study, almost 50% of pharmacists who had done a WBL course (Geo-WBL) undertook some extended patient care activities, and the mean number of years to start extended practice was 4.4 years. The figure for the latter was the lowest for all the 'types of learning' geocodes. The higher percentage figure on the y axis in Figure 5.15, coupled with a shorter time on the x axis, indicate an improvement in participation in extended patient care practice in comparison to the baseline. In a constructivist approach, scaffolded instruction is used to pull an individual into higher levels of development (Wood *et al*, 1976; Daniels, 2001; Kozulin, 2003), p. 106), and development follows learning (Rosa & Montero, 1990; Daniels, 2001). Daniels (2001) has suggested that the use of scaffolded instruction results in a faster application of learning compared to non-scaffolded instruction. The reduction in the mean number of years to start extended practice could lend support to this view. However, because the data was based on a multiple response set, it was not possible to confirm this statistically. Nevertheless, the proportion of pharmacists engaged in extended patient care activities who had done a WBL course was lower than the figure for the NMP course with its specific focus on extended patient care activities, suggesting that specific course content, as well as educational approach, is important. Indeed, just over 50% of the pharmacists who had done a WBL course undertook no extended patient care activities in their routine practice. In addition, although none of these pharmacists did semi-professional activities as their main professional activity, 60% spent most of their time doing professional-technician

activities which can be performed by suitably trained and accredited pharmacy technicians. The reasons for this were not explored in this study. Again, they could relate to workplace affordances (Billett, 2002), which could include whether suitably trained and accredited pharmacy technicians were available to carry out these activities. As discussed in section 2.3, McCann *et al* (2011) identified inadequate resources to cover core services as a barrier to implementing the specific extended patient care activity of pharmacist prescribing. However, the reasons could also relate to a reluctance to entrust roles that were formerly pharmacist-only to pharmacy technicians. Napier *et al* (2016) found this to be the case recently in a study conducted in New Zealand. Although, overall, both pharmacists and pharmacy technicians supported the introduction of advanced roles for pharmacy technicians, pharmacists were less confident about this and had more reservations (Napier *et al*, 2016).

With structured WBL courses, the level of agreement with the statement 'I enjoy this type of learning' was 67.5%. This was lower than the levels seen for the other types of structured courses, possibly because many pharmacists did them to meet the requirements stipulated by their employer. However, it is also possible that the use of a constructivist approach in these WBL courses meant that pharmacists found them challenging and less enjoyable. In a constructivist educational approach, learning and instruction move ahead of development (Rosa & Montero, 1990; Daniels, 2001) and this can make it an uncomfortable experience for the learner (Houle, 1980). In a higher education setting, these lower levels of enjoyment could potentially lead to a reduction in the use of a constructivist approach. This is because it is routine practice to gather student feedback on teaching and learning (Higher Education Funding Council for England, 2014). Indeed, 'teaching and learning' responses have been found to be most indicative of the overall satisfaction result (Higher Education Funding Council for England, 2014). This could prompt higher education institutions to use more popular teaching and learning methods in order to improve student satisfaction scores. In this study, higher levels of enjoyment were seen for structured postgraduate continuing education (CE) courses (82.6%) than for structured work-based learning (WBL) courses (67.5%). The former use a cognitive educational approach whereby development precedes learning (Merriam *et al*, 2007). This makes for a more comfortable learning experience for the student compared to a constructivist approach (Houle, 1980). In addition, as discussed earlier, cognitivism is at the heart of formal educational systems (Hager, 2004), and would thus be a familiar educational approach

for most students (Rosenthal *et al*, 2010). If students give higher satisfaction scores to cognitive teaching and learning methods, this could lead to the perpetuation of the cognitive educational approach. Nevertheless, in this study, the only 'types of learning' that showed an improvement over the baseline were Geo-NMP and Geo-WBL, which both have a constructivist component where learners actively engage in professional practices. This would appear to support Boud and Hager's (2012) suggestion that CPD should be located in the practices that professionals engage in to ensure that learning is applied in the workplace.

Very high levels of enjoyment (93.4%) were seen for doctorate courses in this study. This is possibly because learning is self-directed, and few pharmacists undertook a doctorate to meet the requirements stipulated by their employer. Nevertheless, pharmacists who had done a doctorate (Geo-Doctorate) had the lowest levels of extended practice in this study, and were the only group where the percentage of pharmacists undertaking extended practice was below the baseline. However, the majority of these pharmacists undertook advanced practice activities such as research and education, and were working in academia. These activities are not pharmacy-specific, and are not directly related to patient care. Therefore, although some pharmacists need to undertake these activities in order to develop the pharmacy profession of the future, they are not activities that the majority of pharmacists would need to undertake routinely. Interestingly, academia was thought to be the only expansive sector of pharmacy in this study. Fuller and Unwin (2004a) have suggested that expansive workplace environments support learning at work. This appears to have been the case in this study. The majority of pharmacists who had undertaken a doctorate in academia were working and applying their learning in an academic environment, further supporting the recommendation to locate professional learning in workplace practices (Boud & Hager, 2012).

With regard to undertaking learning to comply with requirements, Cross (1981, p. 243) has noted that "as the learning situation moves toward coercion or compulsion, the power to determine what is studied moves from learner to teacher, and learner orientation moves from solving the learner's problem to satisfying the teacher's requirements". This could explain why the levels of enjoyment for semi-structured learning and WBL, which many pharmacists did to meet the requirements stipulated by their employer, were lower than those seen for doctorate programmes, which few did to

meet the requirements stipulated by their employer. In addition, only pharmacists who had done doctorate programmes had a level of agreement of above 50% (53.33%) for doing the course stop them from getting bored, which may also have contributed to their level of enjoyment. Conversely, the levels of agreement for semi-structured learning and WBL were considerable lower at 7.4% and 15.7% respectively. As this data was obtained from a multiple response set, it was not possible to confirm statistically any potential associations between compulsory learning and enjoyment, or avoidance of boredom and enjoyment.

6.3 Conclusion

The implications of this study for the educational approaches for pharmacists' CPD are that active engagement in structured professional practices during learning seems to improve the application of that learning in the workplace. Conversely, separating theory from practice seems to have no real impact on professional practice. In this study, pharmacists who relied solely on unstructured learning for their CPD were still entrenched in traditional dispensing roles that can be performed by any member of the pharmacy team. Adopting a cognitive approach to semi-structured or structured professional learning did not appear to confer any benefits over unstructured learning with regard to extended patient care practice. This could be because the abstract knowledge learnt in this approach was not being applied routinely in the workplace (Boud & Hager, 2012). Incorporating a constructivist component whereby learners actively engage in professional practices in the workplace led to an improvement in participation in extended practice in this study. These findings support Daniels' (2001) belief that the use of scaffolded instruction can result in faster and better application of learning in practice compared to non-scaffolded instruction. They also support Boud and Hager's (2012) recommendation to locate professional learning in workplace practices. However, this study also found that some work-based learning was not being applied in practice. The reasons for this were not explored, but could relate to workplace affordances, or whether or not pharmacists elected to engage in particular work practices (Billett, 2002). This would warrant further study. Doctorate programmes were found to prepare individuals for advanced practice activities that are not pharmacy-specific, but not for extended patient care practice. Although this would be useful for some pharmacists, it would not be necessary for the majority of pharmacists to undertake this type of learning.

In this study, pharmacists' attitudes about pharmacy practice were also found to have an impact on the professional activities they engaged in. Having an 'Improve skill mix' view of pharmacy practice increased the likelihood of doing some extended practice, whilst the likelihood was reduced by having a 'Maintain current roles' view. This may suggest that some pharmacists were electing not to engage in extended practices in the workplace (Billett, 2004). Indeed, Rosenthal *et al* (2010, p. 37) have identified the reluctance of pharmacists to take on extended patient care roles as "the ultimate barrier to pharmacy practice change". Another possibility could have been a lack of opportunity to participate in extended practices in the workplace. Interestingly, Ashton (2004, p. 49) has indicated that "there is no point in having knowledge and new skills if there are no opportunities to put them into practice". It would be useful to explore these reasons further, particularly as there is currently a drive to increase the numbers of pharmacists undertaking the NMP course on the assumption that this will increase the numbers of pharmacists prescribing in practice (Department of Health, 2016).

Although undertaking CPD with a constructivist educational approach led to an improvement in participation in extended practice in this study, lower levels of enjoyment were seen with structured WBL courses than with other types of learning. This could be because learning precedes development in this approach, which many learners find uncomfortable (Rosa & Montero, 1990; Houle, 1980). The reliance on student feedback to shape teaching and learning experiences, particularly in higher education settings, could potentially lead to a reduction in the use of a constructivist approach in favour of a cognitive educational approach. This could be detrimental in practice, and it is recommended that this is taken into consideration when developing policies for pharmacists' CPD.

CHAPTER 7: CONCLUSIONS

7.1 Introduction

This chapter draws conclusions from the findings of the study. The conclusions relating to the three research questions are summarised in sections 7.1.1, 7.1.2 and 7.1.3. The implications of the study findings for theory, policy and practice are considered further in sections 7.2, 7.3 and 7.4 respectively. Section 7.5 outlines the limitations of the study, and section 7.6 makes some suggestions for further research. The chapter finishes by discussing the distinctiveness and contributions of the study in section 7.7.

7.1.1 Are pharmacists' professional practices influenced by the CPD activities they engage in?

In relation to the first research question, this study found that pharmacists' professional practices were influenced by the CPD activities they engaged in. Pharmacists who relied solely on unstructured learning for their CPD were still entrenched in traditional dispensing roles that can be performed by any member of the pharmacy team. Adopting a cognitive approach to semi-structured or structured professional learning did not appear to confer any benefits over unstructured learning with regard to extended practice. However, incorporating a constructivist component whereby learners actively engage in professional practices in the workplace led to improved engagement in extended patient care activities, and thus was considered to enhance pharmacy practice.

7.1.2 Do pharmacists' attitudes towards CPD, pharmacy practice and their working environment impact on the CPD activities and professional practices that they engage in?

With regard to the second research question, pharmacists' attitudes towards CPD and pharmacy practice, but not their working environment, were found to have an impact on both the CPD activities and professional practices they engaged in. Pharmacists with an 'Improve skill mix' view of professional practice were more like to engage in extended practice, whilst those with a 'Maintain current roles' view were less likely.

Having the latter view also increased the likelihood of a pharmacist doing a traditional continuing education (CE) course, and unstructured learning only, both of which focus mainly on maintaining the status quo. Conversely, the likelihood of doing unstructured learning only, and also engaging in semi-professional activities only, was reduced by having a 'Mastery' approach towards CPD. Pharmacists with this approach were intrinsically motivated, and were thought to have a preference for undertaking challenging learning and professional activities.

7.1.3 What implications do these findings have for the educational approaches for pharmacists' CPD?

The implications of the study findings for the educational approaches for pharmacists' CPD are that active engagement in structured professional practices improved the application of learning in the workplace, whereas separating theory from practice did not. These implications are discussed in more detail in sections 7.2, 7.3 and 7.4.

7.2 Implications for theory

Some authors have recommended using a self-directed, unstructured approach for professional learning, rather than specifying a particular educational approach (Watkins & Marsick, 1992; Chivers, 2010). The findings of this study do not support this recommendation. Pharmacists in this study who relied solely on self-directed, unstructured learning for their CPD were still entrenched in traditional dispensing roles that can be performed by any member of the pharmacy team. As discussed in section 6.2, it is not viable for pharmacists to continue to perform these traditional roles in a 21st Century healthcare system in Northern Ireland, and their roles must shift to the provision of extended patient care (Compton, 2011; Donaldson *et al*, 2014). Norman (1999) has recommended using more structured forms of learning for CPD. However, this study found that structure alone was insufficient in effecting change. Semi-structured and structured learning which used a cognitive educational approach had no real impact on extended practice. This supports the suggestion by Boud and Hager (2012) that abstract knowledge learnt in this approach is not applied routinely in the workplace. Conversely, incorporating a constructivist component into a structured learning programme was found to improve extended practice. This improvement comprised an increase in the proportion of pharmacists undertaking extended patient care activities coupled with a reduction in the time taken to start extended practice.

Therefore, the recommendation that professional learning should be located in workplace practices rather than divorced from them (Boud & Hager, 2012) is supported by this study. In constructivism, scaffolding is used to mediate learning (Kozulin, 2003), as discussed in section 3.5. These findings also support Daniels' (2001) belief that the use of scaffolded instruction can result in faster and better application of learning in practice compared to non-scaffolded instruction.

Pharmacists who had done the non-medical prescribing course (Geo-NMP) undertook the highest proportion of extended practice, and some reduction in time was seen. This course has a very specific curriculum focused on the extended patient care service of prescribing, and uses a hybrid continuing education (CE) / work-based learning (WBL) educational approach. Pharmacists who had done a structured work-based learning course (Geo-WBL) had the largest reduction in time, although it was not possible to confirm statistically whether WBL could expedite extended practice. The WBL courses use a constructivist educational approach, and the learning curriculum is less specific than the non-medical prescribing course. An increase in the proportion of pharmacists undertaking some extended practice was also seen with Geo-WBL, but this was not to the same extent as Geo-NMP. Interestingly, although an increase in the proportion undertaking extended practice was seen in pharmacists who had done semi-structured courses (Geo-Semi-structured) where the learning curriculum is focused on specific extended patient care services; this increase was to a lesser extent than for Geo-NMP and Geo-WBL. In addition, the mean number of years to start extended practice was increased rather than reduced, and thus it was concluded that these courses did not improve participation in extended patient care practice. These courses use a cognitive educational approach where theory is acquired prior to practice. Therefore, the findings of this study suggest that, although having a learning curriculum is important, this needs to be coupled with a constructivist educational approach for improved engagement in extended practice to occur.

The implications of the findings of this study for theory, then, are that a developmental interactionist approach is advocated for pharmacists' CPD (Cross, 1981). In this approach, a learning curriculum is used to specify the kinds of learning experiences that are needed to pull an individual into higher levels of development (Cross, 1981). A developmental interactionist approach entails setting learning goals that exceed the individual's current level of performance (Eraut, 2004a; Ericsson, 2004; Ericsson *et al*,

2007): a constructivist educational approach. A “pathway of activities” in a practice setting is then structured to help the individual to achieve those learning goals (Billett, 2011, p. 26).

7.3 Implications for policy

The implications for policy of recommending a developmental interactionist approach is that policy makers will need to actively decide on a learning curriculum and practice activities for pharmacists’ CPD (Cross, 1981). However, this is based on the assumption that policy makers across the pharmacy profession will agree on the purpose of CPD and its intended outcomes. The stated purpose of CPD in all UK healthcare professions’ CPD policies is to improve professional practice, and thus improve patient outcomes (Cole, 2000; Cleary *et al*, 2011; Donyai *et al*, 2011; Power *et al*, 2011). In this study, improved professional practice for pharmacists was taken to be engagement in extended patient care activities, as recommended in current healthcare policies in Northern Ireland (Compton, 2011; Donaldson *et al*, 2014; Department of Health, Social Services and Public Safety, 2015). However, some pharmacists in this study were found to be in favour of maintaining their current roles rather than extending their practice. As discussed in section 6.2, Braund *et al* (2012) also found that many pharmacists in New Zealand were satisfied with their current role and had little interest in furthering their scope of practice. This could present a barrier for the future to changing CPD policy (Braund *et al*, 2012).

Another potential barrier that was highlighted in section 6.2 is that lower levels of enjoyment were seen with structured WBL courses, which use a constructivist educational approach, than with other types of learning. A possible reason for this could be that learning precedes development in this approach, which many learners find uncomfortable (Rosa & Montero, 1990; Houle, 1980). Higher levels of enjoyment were seen for structured postgraduate continuing education (CE) courses (82.6%) than for structured work-based learning (WBL) courses (67.5%). CE courses use a cognitive educational approach where development precedes learning, and this is a more comfortable and familiar experience for learners (Merriam *et al*, 2007; Houle, 1980; Hager, 2004). It is common practice for higher education institutions and other education providers to use student feedback to shape teaching and learning experiences. If students give higher satisfaction scores to cognitive teaching and

learning methods, this could prolong the use of this approach and impede the adoption of a constructivist educational approach.

Nevertheless, as discussed earlier, a reluctance to implement changes to CPD policy for pharmacists could perpetuate "an ossified model of care that acts against the interests of patients and denies many 21st Century standards of care" (Donaldson *et al*, 2014, p. 39). Therefore, it may be necessary to look beyond student satisfaction at the needs of patients rather than the wants of students. This could mean implementing a CPD policy for pharmacists that is potentially unpopular with some learners. However, this call for a developmental interactionist approach for pharmacists' CPD is in line with contemporary proposals for professional development in healthcare globally. Indeed, the International Pharmaceutical Federation (2014) has recommended using competency based approaches for professional development which involve specified learning goals and deliberate involvement in learning activities in order to expand pharmacists' roles and scopes of practice to assure safe, effective and efficient medication use. In addition, the International Competency-Based Medical Education (ICBME) Collaborators have recommended focusing on competency development and the application of knowledge in practice in the medical profession, rather than on knowledge acquisition (Carraccio *et al*, 2016). The findings of this study support the policy recommendations made by these international bodies.

7.4 Implications for practice

This study found that pharmacists' professional practices were influenced by the CPD activities they engaged in. As discussed earlier, active engagement in structured professional practices improved the application of learning in the workplace, whereas separating theory from practice did not. However, the findings of this study also suggest that simply implementing a CPD policy for pharmacists with a developmental interactionist approach may not necessarily be a panacea for improved professional practice. This is because some learning with a constructivist educational approach was not being applied in the workplace. Indeed, approximately 40% of pharmacists who had done the non-medical prescribing course (Geo-NMP) and 50% who had done structured work-based learning (Geo-WBL) undertook no extended patient care activities at all in their routine practice. The reasons for this were not investigated in this study and therefore can only be speculative, but they could have included a lack of

opportunity or support in the workplace (workplace affordances), or pharmacists electing not to engage in the work practice (Billett, 2002; Billett, 2004). With regard to workplace affordances, the majority (60%) of pharmacists in this study who had done a structured work-based learning (WBL) programme spent most of their time doing activities that can be performed by suitably trained and accredited pharmacy technicians. However, if there were insufficient numbers of pharmacy technicians available to take on those roles in the workplace, then they would have to be performed by pharmacists. This would have diminished the opportunity for those pharmacists to participate in extended practices. It would be useful to explore this further, particularly as there is currently a drive to increase the numbers of pharmacists undertaking the non-medical prescribing course on the assumption that this will increase the numbers of pharmacists prescribing in practice (Department of Health, 2016). Ashton's (2004, p. 49) pertinent advice that "there is no point in having knowledge and new skills if there are no opportunities to put them into practice" indicates that the professional development of pharmacy technicians should also be considered in order to facilitate the implementation of extended patient care practice.

With regard to pharmacists electing not to engage in extended practice, as discussed in section 6.2, this could have been due to a reluctance to entrust roles that were formerly pharmacist-only to pharmacy technicians, as found by Napier *et al* (2016) in New Zealand. Alternatively, it could simply have been that pharmacists were satisfied with their current role and had little interest in extending their practice, as found by Braund *et al* (2012), again in New Zealand. Further qualitative study would be useful to try to interpret and understand the reasons why some pharmacists were not applying their learning in practice. This could help to identify and address barriers to implementing extended patient care practice. On a cautionary note, however, Rosenthal *et al* (2010) have indicated that identifying and removing barriers does not necessarily result in the desired practice change. They have suggested that the reasons for resistance to change could be more complex, involving the personality traits of pharmacists and the culture of the pharmacy profession as a whole (Rosenthal *et al*, 2010).

7.5 Limitations of the research

This study used a postpositive methodological approach which aimed to explain the CPD activities and professional practices that pharmacists engaged in. Quantitative data was collected in an attempt to reduce any potential conflicts of interest between my research and professional roles. Pharmacists' responses were taken to be an accurate reflection of their reality; however, it is acknowledged that the responses were pharmacists' interpretation of their reality and not reality itself (Mercer, 2007). This corresponds with the recognition in postpositivism that there is not an absolute truth that can be uncovered (Costley *et al*, 2010; Hartas, 2010; Hammersley, 2012). A limitation of using a postpositive methodological approach in this study was that it was not possible to explore the reasons why some workplace learning was not applied in practice.

An online questionnaire was used to provide anonymity for participants. However, this resulted in a response rate of 19% after two follow-ups, which is towards the lower end of the range that is routinely observed in online surveys (Bourque & Fielder, 2003). Nevertheless, this still meant that 419 respondents were included in the study. In addition, the response rate was only slightly lower than that achieved in a previous study conducted in Scotland to ascertain factors affecting the views and attitudes of Scottish pharmacists to CPD (Power *et al*, 2011). Here, 552 questionnaires were returned from a sample of 2420 Scottish pharmacists, giving a response rate of 22.8%. However, this represented only 12.8% of the 4300 registered pharmacists in Scotland whereas, in this study, the response rate of 19% represents 19% of all registered pharmacists in Northern Ireland. The percentage of male and female respondents in this study closely reflected the gender profile of PSNI registrants. However, the age range of respondents was higher than that of PSNI registrants; the percentage of hospital pharmacy respondents was also higher, whilst the percentage of community pharmacy respondents was lower. Consideration was given to applying a corrective weight to adjust for the under-representation of community pharmacists in the sample and the over-representation of hospital pharmacists (Acton *et al*, 2009). Weighting tends to be used when response rates are vastly different from those expected (for example, double), and does have the potential to distort results (Acton *et al*, 2009). In the Scottish study mentioned above (Power *et al*, 2011), the percentage of community pharmacy respondents was lower than that of Scottish registrants and a corrective

weight was not applied. On balance, it was decided not to apply a corrective weight in this study.

Another limitation of the online questionnaire used in this study was that participants were able to skip questions if they wished to do so, as discussed earlier in section 4.6. However, this is also a limitation of paper based questionnaires (Bourque & Fielder, 2003).

As discussed in section 5.3.1, pharmacists' attitudes towards their working environment in this study were unexpected. Only those pharmacists working in academia thought they worked in an 'Expansive environment', suggesting that pharmacists working in other sectors (community, hospital and primary care) may have lacked the opportunity and support to implement extended practice in the workplace. These "workplace affordances" (Billett, 2004, p. 114) were not explored, which was another limitation of the study. In addition, pharmacists were only asked about the professional activities that they were routinely undertaking; they were not asked to give reasons for not engaging in extended patient care activities, which may have provided useful information.

7.6 Suggestions for further research

Further study of workplace affordances and elective engagement in professional activities is recommended to try to ascertain the reasons why some workplace learning is not being applied in practice. In addition, because the majority (60%) of pharmacists in this study who had done a structured work-based learning (WBL) programme spent most of their time doing activities that can be performed by suitably trained and accredited pharmacy technicians, it is suggested that the professional development and practice of pharmacy technicians is also considered.

7.7 Distinctiveness and contributions of the study

The use of geometric coding in the field of professional development contributed to the distinctiveness of this study. Geometric coding is an algebraic method which is employed in a mathematical context (Stichtenoth, 1990). It has been used in the healthcare context to assess the impact of different interventions on the management

of complex patients with diabetes (Rascón-Pacheco *et al*, 2010). It can be employed in social science studies (Acton *et al*, 2009) although it does not appear to have been used in the social sciences context. The use of geometric coding in this study enabled the relationship between all the CPD activities that a pharmacist had undertaken and all the professional practices they engaged in, including extended patient care activities, to be analysed statistically. The results of this study contribute new evidence to the field of professional development which demonstrates that the CPD activities that pharmacists undertake can enhance their professional practice. Such evidence regarding the holistic measurement of CPD and professional practice has been missing from the literature until now, possibly because both are complex and multi-factorial in nature with a number of different variables that need to be taken into account (Mathers *et al*, 2012; Neimeyer *et al*, 2012). This evidence can be used to inform theory, policy and practice, as discussed in sections 7.2, 7.3 and 7.4.

7.8 Conclusion

This study found that pharmacists' professional practices were influenced by the CPD activities they engaged in. Pharmacists who relied solely on unstructured learning for their CPD were still entrenched in traditional dispensing roles that can be performed by any member of the pharmacy team. This challenges the view that a flexible educational approach is the most appropriate for professional learning (Watkins & Marsick, 1992; Chivers, 2010). Pharmacists adopting a cognitive approach to professional learning did not appear to be applying the abstract knowledge they had learnt routinely in the workplace (Boud & Hager, 2012). The use of a constructivist educational approach led to faster and better engagement in extended patient care practice (Daniels, 2001), supporting Boud and Hager's (2012) recommendation to locate professional learning in workplace practices. A developmental interactionist approach is advocated for pharmacists' CPD (Cross, 1981) which entails setting learning goals that exceed the individual's current level of performance (Eraut, 2004a; Ericsson, 2004; Ericsson *et al*, 2007) then structuring a "pathway of activities" in a practice setting to help the individual to achieve those learning goals (Billett, 2011, p. 26). However, the findings of this study also suggest that implementing such an approach would not necessarily achieve full participation in extended patient care practice. This is because some pharmacists who had undertaken learning with a constructivist educational approach were not applying their learning in practice. This

could have been due to a lack of opportunity or support in the workplace (workplace affordances), or pharmacists electing not to engage in the work practice (Billett, 2002; Billett, 2004). A limitation of using a postpositive methodological approach in this study was that it was not possible to explore the reasons for this in order to identify and address barriers to implementing extended patient care practice. Despite its limitations, however, the distinctive nature of this study has made a valuable contribution to the field of professional development, and can be used to inform theory, policy and practice relating to pharmacists' CPD.

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APPENDICES

Appendix 1. Questionnaire questions - professional activities

This section includes questions about the professional activities you currently engage in. You will be asked to provide information about the activities that you routinely engage in every week (up to a maximum of 5 activities).

12. In a typical week, do you routinely engage in pharmacy professional activities?
    Yes / No

If you answered No, please move on to Question 13.

If you answered Yes, please give details of each professional activity below, starting with the activity do you do most frequently and/or spend most of your time doing.

In a typical week, which professional activity do you do most frequently and/or spend most of your time doing (please select ONE)?

- Dispensing and/or preparing medicines and/or products
- Accuracy checking dispensed and/ or prepared medicines and/or products
- Clinically checking prescriptions for appropriateness for individual patients
- Taking medication histories from patients to obtain an accurate list of their medicines
- Reviewing individual patients and optimising their medicines / MUR
- Prescribing medicines as a qualified Pharmacist Prescriber
- Purchasing and/or procuring medicines and/or products
- Providing medicines information and/or pharmaceutical advice
- Health promotion and prevention
- Leading & managing a team and/or service
- Educating & training staff and/or trainees
- Research and/or service development
- Other (please specify).....

i. Please give the (approximate) year that you started doing this activity:

- 2015
- 2014
- 2013
- 2012
- 2011
- 2010
- 2009 etc

ii. Your views about doing this activity - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I feel confident doing this activity
- I enjoy doing this activity
- Doing this activity is an effective use of my professional knowledge and skills
- It would be more appropriate for a pharmacy technician to do this activity
- It would be more appropriate for a doctor to do this activity

Add another activity? (or DONE)

Appendix 2. Questionnaire questions - CPD activities

6. Have you undertaken any **long degree-credit courses** (including Foundation / Certificate / Diploma / Masters / Doctorate programmes) since you registered as a pharmacist?

Yes / No

If you answered No, please move on to Question 7.

If you answered Yes, please give details of each course below, starting with the course you did first and finishing with the course you did most recently:

Choose ONE course from the list:

- QUB Clinical Pharmacy Diploma/MSc
- QUB Community Pharmacy Diploma/MSc
- NICPLD VT/Foundation Programme
- QUB Advanced Pharmacy Practice (with IP) Diploma/MSc
- Non Medical Prescribing standalone course
- PTQA Diploma/MSc
- DPharm
- PhD
- Other (please specify).....

i. Have you COMPLETED this course?

Yes / No

If you answered No, please move on to section ii.

If you answered Yes, please give the year that you completed this course:

- 2014
- 2013
- 2012
- 2011
- 2010
- 2009 etc

ii. Your reasons for doing this course - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- To get an additional qualification
- To learn new knowledge and skills and become a more competent practitioner
- To enable me to get a higher graded and / or better paid job
- My employer and / or the pharmacy regulator required me to do it
- To avoid boredom and give me something to do
- To meet up and discuss issues with fellow professionals
- I don't know; there may be good reasons but I don't see any

iii. Your views about this course - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I enjoyed the course
- I would be willing to do more courses like this
- The course was relevant to my career
- The course helped me to update my existing professional practice
- The course helped me to extend my professional practice / take on new roles

Add another course? (or DONE)

7. Have you undertaken any **short accredited courses** (i.e. courses that are a pre-requisite to service delivery) since you registered as a pharmacist?

Yes / No

If you answered No, please move on to question 8.

If you answered Yes, please give details of each course below, starting with the course you did first and finishing with the course you did most recently:

<u>Course 1:</u>

Choose ONE course from the list:

- Managing your Medicines
- PMRR
- Pharmacy Services to Care Homes

- Substitution Prescribing
- Smoking Cessation
- Health+

i. Have you COMPLETED this course?

Yes / No

If you answered No, please move on to section ii.

If you answered Yes, please give the year that you completed this course:

- 2014
- 2013
- 2012
- 2011
- 2010
- 2009 etc

ii. Your reasons for doing this course - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- To get a certificate of accreditation
- To learn new knowledge and skills and become a more competent practitioner
- To enable me to get a higher graded and / or better paid job
- My employer and / or the pharmacy regulator required me to do it
- To avoid boredom and give me something to do
- To meet up and discuss issues with fellow professionals
- I don’t know; there may be good reasons but I don’t see any

iii. Your views about this course - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I enjoyed the course
- I would be willing to do more courses like this
- The course was relevant to my career
- The course helped me to update my existing professional practice
- The course helped me to extend my professional practice / take on new roles

Add another course? (or DONE) (etc)

8. Do you ever attend **live workshops** and / or **roadshows**?

Yes / No

If you answered No, please move on to question 9.

If you answered Yes, please answer the questions below:

i. How often do you attend live workshops and / or roadshows?

- Occasionally – it depends on the subject
- Once or twice a year
- Three to five times a year
- More than 5 times a year

ii. Your reasons for attending live workshops and / or roadshows - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- To get a certificate of attendance
- To learn new knowledge and skills and become a more competent practitioner
- To enable me to get a higher graded and / or better paid job
- My employer and / or the pharmacy regulator require me to do it
- To avoid boredom and give me something to do
- To meet up and discuss issues with fellow professionals
- I don't know; there may be good reasons but I don't see any

iii. Your views about live workshops and / or roadshows - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I enjoy attending live workshops and / or roadshows
- I would be willing to attend more live workshops and / or roadshows in the future
- Live workshops and / or roadshows are relevant to my career
- Live workshops and / or roadshows help me to update my existing professional practice

- Live workshops and / or roadshows help me to extend my professional practice / take on new roles

9. Do you ever do **short distance learning courses** (online and / or printed)?

Yes / No

If you answered No, please move on to question 10.

If you answered Yes, please answer the questions below:

i. How often do you do short distance learning courses?

- Occasionally – it depends on the subject
- Once or twice a year
- Three to five times a year
- More than 5 times a year

ii. Your reasons for doing short distance learning courses - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- To get a certificate of completion
- To learn new knowledge and skills and become a more competent practitioner
- To enable me to get a higher graded and / or better paid job
- My employer and / or the pharmacy regulator require me to do it
- To avoid boredom and give me something to do
- To avoid having to meet up and discuss issues with fellow professionals
- I don't know; there may be good reasons but I don't see any

iii. Your views about short distance learning courses - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I enjoy doing short distance learning courses
- I would be willing to do more short distance learning courses in the future
- Short distance learning courses are relevant to my career
- Short distance learning courses help me to update my existing professional practice
- Short distance learning courses help me to extend my professional practice / take on new roles

10. Do you ever learn **informally on-the-job** (ie unscheduled learning resulting from situations you have encountered in your day-to-day practice at work)?

Yes / No

If you answered No, please move on to question 11.

If you answered Yes, please answer the questions below:

i. How much of your learning occurs informally on-the-job?

- A little
- Some
- Most
- All

ii. Your reasons for learning informally on-the-job - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- To learn new knowledge and skills and become a more competent practitioner
- To enable me to get a higher graded and / or better paid job
- My employer and / or the pharmacy regulator require me to do it
- To avoid boredom and give me something to do
- To meet up and discuss issues with fellow professionals
- I don't know; there may be good reasons but I don't see any

iii. Your views about informal on-the-job learning - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I enjoy learning informally on-the-job
- I would be willing to do more informal on-the-job learning in the future
- Informal on-the-job learning is relevant to my career
- Informal on-the-job learning helps me to update my existing professional practice
- Informal on-the-job learning helps me to extend my professional practice / take on new roles

Appendix 3. Pharmacists' attitudes towards CPD, pharmacy practice and their working environment

Pharmacists' attitudes towards CPD:

11. Your preferences regarding learning activities - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- I like to read up about a subject on my own
- I like to discuss issues and scenarios with fellow professionals
- I like a teacher to present me with all the relevant information
- I like to do well and get high marks
- I like to have a goal to work towards
- I like to participate in real life tasks in the workplace
- I like to learn about changes or new situations I have encountered in my practice
- I don't like getting things wrong and try not to make mistakes when I'm learning
- I like to get a certificate or credits when I complete a learning activity
- I like to do difficult activities that challenge me to learn new things
- I like learning activities that can be completed in a short space of time
- I am happy just to pass a learning activity; if I get a high mark, that is an added bonus
- I like learning activities that are easy and require little work
- I don't mind making a mistake when I do an activity because I can learn from it
- I don't mind activities that take a long time to complete if I know that eventually I will learn a lot

Pharmacists' attitudes towards pharmacy practice:

13. Your views on the roles of pharmacists and pharmacy technicians – please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree).

What are your views on the roles of **pharmacists**? Please indicate whether or not you agree with each of the following statements:

- Pharmacists should maintain their current roles
- Pharmacists should take on some additional roles that were traditionally done by doctors
- Some of the roles that pharmacists currently do should be done by appropriately trained pharmacy technicians
- Pharmacists should not take on any additional roles

What are your views on the roles of **pharmacy technicians**? Please indicate whether or not you agree with each of the following statements:

- Pharmacy technicians should maintain their current roles
- Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists
- Some of the roles that pharmacy technicians currently do should be done by appropriately trained pharmacy assistants
- Pharmacy technicians should not take on any additional roles

Pharmacists' attitudes towards their working environment:

i. Your views about learning & development in the workplace - please rate the following statements (Likert scale – 1 = strongly disagree, 5 = strongly agree):

- A high value is placed on developing all staff
- Service provision takes priority over staff development
- Staff development focuses on helping individuals to do their current job
- Staff development focuses on helping individuals to progress in their career
- Staff have access to a broad range of experiences relating to the service as a whole
- Staff have access to a narrow range of experiences relating mainly to their current job

Appendix 4. Participant information sheet

Continuing Professional Development (CPD) for pharmacists: implications for professional practice

Dear Pharmacist,

You are being invited to participate in a study that is being conducted by Laura O'Loan, a Doctorate in Education (EdD) student at the School of Education, Queen's University Belfast. The study is entitled "Continuing Professional Development (CPD) for pharmacists: implications for professional practice". Please read the following information, which should answer any queries you may have in relation to this study.

What is the purpose of the study?
The aim of this study is to explore the implications of the educational approach that pharmacists use for their CPD on their professional practice. Pharmacists in Northern Ireland have access to a variety of learning methods to support their CPD. The results of this study could inform the educational approaches that are used to support CPD in the future. This in turn may help to extend pharmacy professional practice and could potentially improve outcomes for patients.

Why have I been chosen?
You have received this email because you are a pharmacist registered with the Pharmaceutical Society of Northern Ireland (PSNI). All registrants must undertake CPD activities in order to have their name retained in the register and to maintain competence. You have also registered your email address with the Northern Ireland Centre for Pharmacy Learning & Development (NICPLD) to enable you to access a variety of learning resources which support CPD. NICPLD has agreed to distribute this questionnaire to all pharmacists on its database on behalf of Laura O'Loan, a Doctorate in Education (EdD) student at the School of Education, Queen's University Belfast.

Do I have to take part?
Participation in this study is entirely voluntary. You are under no obligation to take part. It is important to point out that the study is independent of both NICPLD and the PSNI. Your decision on whether or not to take part in the study will not impact on your current or future relationship with NICPLD or the PSNI.

If I decide to take part, what will I have to do?
If you decide to take part all that is asked of you is to complete an online questionnaire. This will take approximately 10-15 minutes to complete and will be submitted electronically. The questionnaire can be completed in your own time from any location where you can access the internet.

What are the risks and/or disadvantages of taking part?
There are no disadvantages or risks associated with participating in this study.

Are there any possible benefits in taking part?
There are no immediate benefits to you taking part in this study. However, the results of the study may help to inform the educational approaches that are used to support CPD in the future. This in turn may help to extend pharmacy professional practice and could potentially improve outcomes for patients.

Will my taking part in this study be kept confidential?
The questionnaire will be completely anonymous and all data obtained will be held securely and in confidence at Queen's University Belfast. At no point will any individual or organisation be identified.

What will happen to the results of the study?
The results of the study will be included in a research dissertation which may be held in the library at Queen's University Belfast. They may also be presented at conferences and published as conference proceedings and/or research articles in peer-reviewed journals.

Who is organising and funding the research?
The study is a piece of doctoral research being undertaken by Laura O'Loan, a Doctorate in Education (EdD) student at the School of Education, Queen's University Belfast. The project is being supervised by Dr Caitlin Donnelly, Senior Lecturer in the School of Education, Queen's University Belfast. No funding has been provided to conduct this study.

Who has approved the study?
The study has been approved by Queen's University Belfast School of Education's Research Ethics Committee.

If I decide to take part, can I change my mind later and withdraw from the study?
You can withdraw from the study at any time until you have submitted the online questionnaire. However, because all responses are anonymous, once you have submitted your questionnaire you will not be able to withdraw from the study. Responses from all completed questionnaires that have been submitted will be included in the study.

How do I give my consent to participate in the study?
Your consent to participate in the study will be considered implicit on questionnaire completion and submission. By completing and submitting the questionnaire it will be assumed that you consent to and understand the following:

- You are being asked to complete an online questionnaire
- Participation in the study is voluntary and you can withdraw at any time until the online questionnaire has been submitted
- By submitting a questionnaire, you have indicated your agreement to participate in the study
- Responses from all completed questionnaires that are submitted will be included in the study
- No individual or organisation will be identifiable from the questionnaires submitted
- The study is being conducted independently of both NICPLD and the PSNI
- Your decision on whether or not to participate in the study will not impact on your current or future relationship with NICPLD or the PSNI
- All information gathered will be kept confidential
- The results of the study will be included in a research dissertation which may be held in the library at Queen's University Belfast, and may also be presented at conferences and published as conference proceedings and/or research articles in peer-reviewed journals

Contact details:

If you would like further information about this study, please contact:

Laura O'Loan, EdD student,
School of Education, Queen's University Belfast,
69/71 University Street, Belfast BT7 1HL
(email: loloan01@qub.ac.uk)

Appendix 5. Covering email

Dear Pharmacist,

My name is Laura O'Loan and I am Assistant Director for Vocational Programmes at NICPLD. I am also currently enrolled on a Doctorate in Education (EdD) programme at the School of Education, Queen's University Belfast. I am writing to ask you to participate in a piece of doctoral research that I am conducting entitled "Continuing Professional Development (CPD) for pharmacists: implications for professional practice". I would like to assure you that I am undertaking this research in my capacity as a doctoral student rather than as a member of staff at NICPLD. This means that the research is being conducted independently of NICPLD, and thus I will be considering all forms of CPD that pharmacists undertake and not just the learning resources that are provided by NICPLD (including the courses that I am directly involved in).

All pharmacists registered with the Pharmaceutical Society of Northern Ireland (PSNI) must undertake CPD activities in order to have their name retained in the register and to maintain competence. In recent years there has been an increasing pressure in the healthcare sector to ensure that the educational approaches used to support CPD will enable professionals to extend the practices they engage in and, in turn, improve outcomes for patients. Practical work-based learning has been promoted by some as being the most effective educational approach for extending practice amongst healthcare professionals. However, others advocate a more flexible educational approach and suggest that the choice of learning methods should depend on the individual learner.

Pharmacists in Northern Ireland have access to a variety of learning methods to support their CPD. The aim of this study is to explore the implications of the educational approach that pharmacists use for their CPD on their professional practice. A questionnaire has been developed to address this issue. Please click on the link below to access the questionnaire, which should take approximately 10-15 minutes to complete and will be submitted electronically. All responses will be anonymous. The survey will remain open until **Friday 12th June 2015**.

This email has been sent to all registered pharmacists in Northern Ireland. Please note that you are under no obligation to complete the questionnaire, and that this research is being conducted independently of both NICPLD and the PSNI.

Before you decide whether or not to participate in this study, please read the Participant Information Sheet which is attached to this email. If you have any questions about the study, please do not hesitate to contact me using the email address provided below. Thank you for your time.

https://www.surveymonkey.com/s/327XXY2

Yours sincerely,

Laura O'Loan
EdD student
School of Education
Queen's University Belfast
69/71 University Street
Belfast BT7 1HL

E-mail: loloan01@qub.ac.uk

Appendix 6. Post hoc Scheffé test: 'I enjoy doing this activity' by main professional activity

Multiple Comparisons

Dependent Variable: Enjoy_practice1

Scheffe

(I) Professional practices 1	(J) Professional practices 1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Semi_prof	Prof_tech	.03636	.16459	1.000	-.5159	.5886
	Prof_pharm	-.52643	.18804	.170	-1.1574	.1045
	Ext_prof_pharm	-.95455*	.22897	.005	-1.7229	-.1862
	Adv_serv	-.71919*	.18591	.012	-1.3430	-.0954
	Other	-.45455	.29560	.796	-1.4464	.5373
Prof_tech	Semi_prof	-.03636	.16459	1.000	-.5886	.5159
	Prof_pharm	-.56279*	.16582	.045	-1.1192	-.0064
	Ext_prof_pharm	-.99091*	.21110	.001	-1.6993	-.2826
	Adv_serv	-.75556*	.16340	.001	-1.3038	-.2073
	Other	-.49091	.28199	.695	-1.4371	.4553
Prof_pharm	Semi_prof	.52643	.18804	.170	-.1045	1.1574
	Prof_tech	.56279*	.16582	.045	.0064	1.1192
	Ext_prof_pharm	-.42812	.22986	.629	-1.1994	.3432
	Adv_serv	-.19276	.18700	.957	-.8202	.4347
	Other	.07188	.29629	1.000	-.9223	1.0661

	Semi_prof	.95455*	.22897	.005	.1862	1.7229
	Prof_tech	.99091*	.21110	.001	.2826	1.6993
Ext_prof_pharm	Prof_pharm	.42812	.22986	.629	-.3432	1.1994
	Adv_serv	.23535	.22812	.957	-.5301	1.0008
	Other	.50000	.32382	.793	-.5866	1.5866
	Semi_prof	.71919*	.18591	.012	.0954	1.3430
	Prof_tech	.75556*	.16340	.001	.2073	1.3038
Adv_serv	Prof_pharm	.19276	.18700	.957	-.4347	.8202
	Ext_prof_pharm	-.23535	.22812	.957	-1.0008	.5301
	Other	.26465	.29495	.976	-.7250	1.2543
	Semi_prof	.45455	.29560	.796	-.5373	1.4464
	Prof_tech	.49091	.28199	.695	-.4553	1.4371
Other	Prof_pharm	-.07188	.29629	1.000	-1.0661	.9223
	Ext_prof_pharm	-.50000	.32382	.793	-1.5866	.5866
	Adv_serv	-.26465	.29495	.976	-1.2543	.7250

*. The mean difference is significant at the 0.05 level.

Appendix 7. Post hoc Scheffé test: 'Doing this activity is an effective use of my professional knowledge and skills' by main professional activity

Multiple Comparisons

Dependent Variable: Effective_practice1

Scheffe

(I) Professional practices 1	(J) Professional practices 1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Semi_prof	Prof_tech	.01389	.16813	1.000	-.5503	.5780
	Prof_pharm	-.76693*	.19242	.009	-1.4126	-.1213
	Ext_prof_pharm	-1.22540*	.23845	.000	-2.0255	-.4253
	Adv_serv	-.84444*	.19022	.002	-1.4827	-.2062
	Other	-.60202	.30348	.560	-1.6203	.4163
Prof_tech	Semi_prof	-.01389	.16813	1.000	-.5780	.5503
	Prof_pharm	-.78081*	.17062	.001	-1.3533	-.2083
	Ext_prof_pharm	-1.23929*	.22123	.000	-1.9816	-.4969
	Adv_serv	-.85833*	.16813	.000	-1.4225	-.2942
	Other	-.61591	.29015	.481	-1.5895	.3577
Prof_pharm	Semi_prof	.76693*	.19242	.009	.1213	1.4126
	Prof_tech	.78081*	.17062	.001	.2083	1.3533
	Ext_prof_pharm	-.45847	.24021	.603	-1.2645	.3475
	Adv_serv	-.07752	.19242	.999	-.7232	.5681
	Other	.16490	.30487	.998	-.8581	1.1879

	Semi_prof	1.22540*	.23845	.000	.4253	2.0255
	Prof_tech	1.23929*	.22123	.000	.4969	1.9816
Ext_prof_pharm	Prof_pharm	.45847	.24021	.603	-.3475	1.2645
	Adv_serv	.38095	.23845	.768	-.4192	1.1811
	Other	.62338	.33583	.632	-.5035	1.7502
	Semi_prof	.84444*	.19022	.002	.2062	1.4827
	Prof_tech	.85833*	.16813	.000	.2942	1.4225
Adv_serv	Prof_pharm	.07752	.19242	.999	-.5681	.7232
	Ext_prof_pharm	-.38095	.23845	.768	-1.1811	.4192
	Other	.24242	.30348	.986	-.7759	1.2608
	Semi_prof	.60202	.30348	.560	-.4163	1.6203
	Prof_tech	.61591	.29015	.481	-.3577	1.5895
Other	Prof_pharm	-.16490	.30487	.998	-1.1879	.8581
	Ext_prof_pharm	-.62338	.33583	.632	-1.7502	.5035
	Adv_serv	-.24242	.30348	.986	-1.2608	.7759

*. The mean difference is significant at the 0.05 level.

Appendix 8. Post hoc Scheffé test: 'It would be more appropriate for a pharmacy technician to do this activity' by main professional activity

Multiple Comparisons

Dependent Variable: Tech_practice1

Scheffe

(I) Professional practices 1	(J) Professional practices 1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Semi_prof	Prof_tech	.00972	.17653	1.000	-.5826	.6021
	Prof_pharm	1.12455*	.20203	.000	.4467	1.8024
	Ext_prof_pharm	1.41313*	.24645	.000	.5862	2.2401
	Adv_serv	1.39040*	.20085	.000	.7165	2.0643
	Other	1.18586*	.31864	.019	.1167	2.2550
Prof_tech	Semi_prof	-.00972	.17653	1.000	-.6021	.5826
	Prof_pharm	1.11483*	.17914	.000	.5137	1.7159
	Ext_prof_pharm	1.40341*	.22806	.000	.6382	2.1687
	Adv_serv	1.38068*	.17781	.000	.7841	1.9773
	Other	1.17614*	.30464	.012	.1539	2.1983
Prof_pharm	Semi_prof	-1.12455*	.20203	.000	-1.8024	-.4467
	Prof_tech	-1.11483*	.17914	.000	-1.7159	-.5137
	Ext_prof_pharm	.28858	.24832	.929	-.5447	1.1218
	Adv_serv	.26586	.20315	.887	-.4158	.9475
	Other	.06131	.32009	1.000	-1.0127	1.1354

	Semi_prof	-1.41313*	.24645	.000	-2.2401	-.5862
	Prof_tech	-1.40341*	.22806	.000	-2.1687	-.6382
Ext_prof_pharm	Prof_pharm	-.28858	.24832	.929	-1.1218	.5447
	Adv_serv	-.02273	.24737	1.000	-.8528	.8073
	Other	-.22727	.34983	.995	-1.4011	.9466
	Semi_prof	-1.39040*	.20085	.000	-2.0643	-.7165
	Prof_tech	-1.38068*	.17781	.000	-1.9773	-.7841
Adv_serv	Prof_pharm	-.26586	.20315	.887	-.9475	.4158
	Ext_prof_pharm	.02273	.24737	1.000	-.8073	.8528
	Other	-.20455	.31935	.995	-1.2761	.8670
	Semi_prof	-1.18586*	.31864	.019	-2.2550	-.1167
	Prof_tech	-1.17614*	.30464	.012	-2.1983	-.1539
Other	Prof_pharm	-.06131	.32009	1.000	-1.1354	1.0127
	Ext_prof_pharm	.22727	.34983	.995	-.9466	1.4011
	Adv_serv	.20455	.31935	.995	-.8670	1.2761

*. The mean difference is significant at the 0.05 level.

Appendix 9. Post hoc Scheffé test: 'It would be more appropriate for a doctor to do this activity' by main professional activity

Multiple Comparisons

Dependent Variable: Doctor_practice1

Scheffe

(I) Professional practices 1	(J) Professional practices 1	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Semi_prof	Prof_tech	-.01944	.13057	1.000	-.4576	.4187
	Prof_pharm	-.14212	.14943	.970	-.6435	.3593
	Ext_prof_pharm	-.58081	.18229	.075	-1.1925	.0308
	Adv_serv	.13333	.14773	.976	-.3623	.6290
	Other	-.08081	.23569	1.000	-.8716	.7100
Prof_tech	Semi_prof	.01944	.13057	1.000	-.4187	.4576
	Prof_pharm	-.12267	.13250	.973	-.5673	.3219
	Ext_prof_pharm	-.56136	.16869	.054	-1.1274	.0047
	Adv_serv	.15278	.13057	.927	-.2853	.5909
	Other	-.06136	.22534	1.000	-.8174	.6947
Prof_pharm	Semi_prof	.14212	.14943	.970	-.3593	.6435
	Prof_tech	.12267	.13250	.973	-.3219	.5673
	Ext_prof_pharm	-.43869	.18368	.339	-1.0550	.1776
	Adv_serv	.27545	.14943	.639	-.2259	.7769
	Other	.06131	.23676	1.000	-.7331	.8557

	Semi_prof	.58081	.18229	.075	-.0308	1.1925
	Prof_tech	.56136	.16869	.054	-.0047	1.1274
Ext_prof_pharm	Prof_pharm	.43869	.18368	.339	-.1776	1.0550
	Adv_serv	.71414*	.18229	.010	.1025	1.3258
	Other	.50000	.25876	.589	-.3682	1.3682
	Semi_prof	-.13333	.14773	.976	-.6290	.3623
	Prof_tech	-.15278	.13057	.927	-.5909	.2853
Adv_serv	Prof_pharm	-.27545	.14943	.639	-.7769	.2259
	Ext_prof_pharm	-.71414*	.18229	.010	-1.3258	-.1025
	Other	-.21414	.23569	.975	-1.0050	.5767
	Semi_prof	.08081	.23569	1.000	-.7100	.8716
	Prof_tech	.06136	.22534	1.000	-.6947	.8174
Other	Prof_pharm	-.06131	.23676	1.000	-.8557	.7331
	Ext_prof_pharm	-.50000	.25876	.589	-1.3682	.3682
	Adv_serv	.21414	.23569	.975	-.5767	1.0050

*. The mean difference is significant at the 0.05 level.

Appendix 10. Correlation matrix – pharmacists' attitudes towards CPD (15 questions)

Correlation Matrix

	I like to read up about a subject on my own	I like to discuss issues and scenarios with fellow professionals	I like a teacher to present me with all the relevant information	I like to do well and get high marks	I like to have a goal to work towards	I like to participate in real life tasks in the workplace	I like to learn about changes or new situations I have encountered in my practice
I like to read up about a subject on my own	1.000	.056	-.119	.232	.273	.084	.202
I like to discuss issues and scenarios with fellow professionals	.056	1.000	.235	.110	.187	.467	.378
I like a teacher to present me with all the relevant information	-.119	.235	1.000	.148	.089	.189	.156
I like to do well and get high marks	.232	.110	.148	1.000	.598	.192	.300
I like to have a goal to work towards	.273	.187	.089	.598	1.000	.415	.486
I like to participate in real life tasks in the workplace	.084	.467	.189	.192	.415	1.000	.564
I like to learn about changes or new situations I have encountered in my practice	.202	.378	.156	.300	.486	.564	1.000
I don't like getting things wrong and try not to make mistakes when I'm learning	.110	.047	.128	.460	.308	.045	.112
I like to get a certificate or credits when I complete a learning activity	.084	.007	.242	.377	.362	.141	.177
I like difficult activities that challenge me to learn new things	.222	.291	.063	.224	.365	.367	.388
I like learning activities that can be completed in a short space of time	.095	-.028	.084	.203	.102	.112	.128
I am happy just to pass a learning activity; if I get a high mark, that is an added bonus	-.150	-.143	.014	-.310	-.300	-.144	-.228
I like learning activities that are easy and require little work	-.173	-.238	.175	.016	-.113	-.127	-.160
I don't mind making a mistake when I do an activity because I can learn from it	.136	.036	-.042	-.035	.047	.128	.127
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	.204	.205	.034	.107	.180	.131	.221

Correlation Matrix

	I don't like getting things wrong and try not to make mistakes when I'm learning	I like to get a certificate or credits when I complete a learning activity	I like difficult activities that challenge me to learn new things	I like learning activities that can be completed in a short space of time	I am happy just to pass a learning activity; if I get a high mark, that is an added bonus	I like learning activities that are easy and require little work	I don't mind making a mistake when I do an activity because I can learn from it	I don't mind activities that take a long time to complete if I know that eventually I will learn a lot
I like to read up about a subject on my own	.110	.084	.222	.095	-.150	-.173	.136	.204
I like to discuss issues and scenarios with fellow professionals	.047	.007	.291	-.028	-.143	-.238	.036	.205
I like a teacher to present me with all the relevant information	.128	.242	.063	.084	.014	.175	-.042	.034
I like to do well and get high marks	.460	.377	.224	.203	-.310	.016	-.035	.107
I like to have a goal to work towards	.308	.362	.365	.102	-.300	-.113	.047	.180
I like to participate in real life tasks in the workplace	.045	.141	.367	.112	-.144	-.127	.128	.131
I like to learn about changes or new situations I have encountered in my practice	.112	.177	.388	.128	-.228	-.160	.127	.221
I don't like getting things wrong and try not to make mistakes when I'm learning	1.000	.266	.164	.172	-.142	.059	-.227	.111
I like to get a certificate or credits when I complete a learning activity	.266	1.000	.128	.192	-.034	.182	.123	.097
I like difficult activities that challenge me to learn new things	.164	.128	1.000	-.067	-.191	-.296	.132	.382
I like learning activities that can be completed in a short space of time	.172	.192	-.067	1.000	.137	.322	-.040	-.184
I am happy just to pass a learning activity; if I get a high mark, that is an added bonus	-.142	-.034	-.191	.137	1.000	.391	.069	-.220
I like learning activities that are easy and require little work	.059	.182	-.296	.322	.391	1.000	-.056	-.228
I don't mind making a mistake when I do an activity because I can learn from it	-.227	.123	.132	-.040	.069	-.056	1.000	.249
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	.111	.097	.382	-.184	-.220	-.228	.249	1.000

Appendix 11. Pharmacists' attitudes towards CPD - communalities

Communalities

	Initial	Extraction
I like to read up about a subject on my own	1.000	.548
I like to discuss issues and scenarios with fellow professionals	1.000	.617
I like a teacher to present me with all the relevant information	1.000	.667
I like to do well and get high marks	1.000	.696
I like to have a goal to work towards	1.000	.656
I like to participate in real life tasks in the workplace	1.000	.727
I like to learn about changes or new situations I have encountered in my practice	1.000	.660
I don't like getting things wrong and try not to make mistakes when I'm learning	1.000	.597
I like to get a certificate or credits when I complete a learning activity	1.000	.616
I like difficult activities that challenge me to learn new things	1.000	.493
I like learning activities that can be completed in a short space of time	1.000	.641
I am happy just to pass a learning activity; if I get a high mark, that is an added bonus	1.000	.556
I like learning activities that are easy and require little work	1.000	.668
I don't mind making a mistake when I do an activity because I can learn from it	1.000	.728
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	1.000	.631

Extraction Method: Principal Component Analysis.

Appendix 12. Pharmacists' attitudes towards CPD – total variance

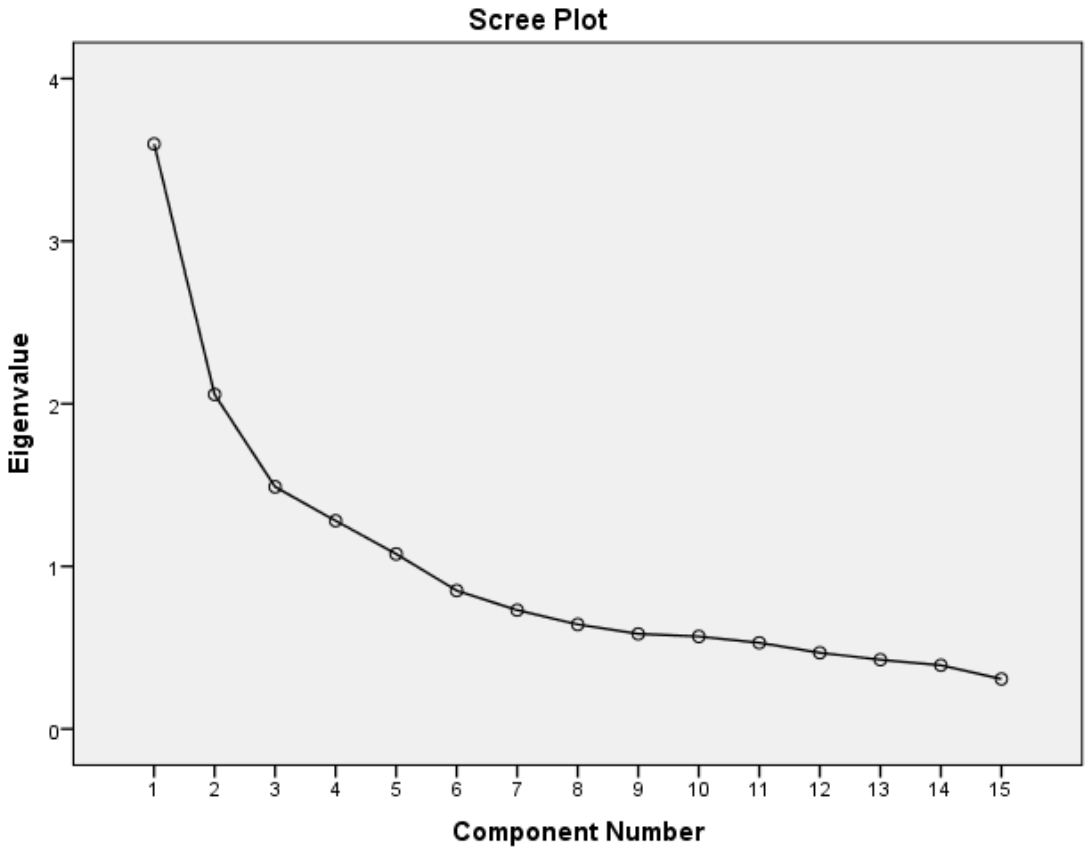
Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.598	23.984	23.984	3.598	23.984	23.984	2.878
2	2.057	13.716	37.700	2.057	13.716	37.700	1.894
3	1.489	9.925	47.625	1.489	9.925	47.625	2.701
4	1.280	8.535	56.160	1.280	8.535	56.160	1.490
5	1.076	7.174	63.334	1.076	7.174	63.334	1.428
6	.851	5.672	69.006				
7	.731	4.871	73.878				
8	.643	4.284	78.161				
9	.584	3.896	82.057				
10	.569	3.791	85.848				
11	.530	3.532	89.381				
12	.469	3.124	92.505				
13	.426	2.838	95.343				
14	.391	2.610	97.952				
15	.307	2.048	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Appendix 13. Scree plot: pharmacists' attitudes towards CPD (15 items)



Appendix 14. Pharmacists' attitudes towards CPD – component matrix

Component Matrix[a]

	Component				
	1	2	3	4	5
I like to have a goal to work towards	.762				
I like to learn about changes or new situations I have encountered in my practice	.718				
I like to participate in real life tasks in the workplace	.635		.489		
I like to do well and get high marks	.635	.421	-.339		
I like difficult activities that challenge me to learn new things	.635				
I like to discuss issues and scenarios with fellow professionals	.497		.439	-.342	
I am happy just to pass a learning activity; if I get a high mark, that is an added bonus	-.456		.441		
I like learning activities that are easy and require little work		.692			
I like learning activities that can be completed in a short space of time		.611			-.453
I like to get a certificate or credits when I complete a learning activity	.405	.502			.348
I don't like getting things wrong and try not to make mistakes when I'm learning	.395	.453	-.400		
I don't mind making a mistake when I do an activity because I can learn from it				.729	
I like to read up about a subject on my own	.389		-.320	.434	-.312
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	.441	-.375			.471
I like a teacher to present me with all the relevant information		.329	.443		.469

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Appendix 15. Pharmacists' attitudes towards CPD – structure matrix

Structure Matrix

	Component				
	1	2	3	4	5
I like to participate in real life tasks in the workplace	.837				
I like to learn about changes or new situations I have encountered in my practice	.789		.318		
I like to discuss issues and scenarios with fellow professionals	.718				
I like difficult activities that challenge me to learn new things	.546	.382	.307	.327	
Flipped I like learning activities that can be completed in a short space of time		.720			
Flipped I like learning activities that are easy	.308	.711			-.398
Flipped I am happy just to pass a learning activity		.548	.382		
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot		.545		.544	
I like to do well and get high marks			.821		
I don't like getting things wrong and try not to make mistakes when I'm learning			.730		
I like to have a goal to work towards	.534		.688		
I like to get a certificate or credits when I complete a learning activity			.604	.442	
I don't mind making a mistake when I do an activity because I can learn from it				.806	
I like a teacher to present me with all the relevant information					.712
I like to read up about a subject on my own					-.652

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Appendix 16. Pharmacists' attitudes towards CPD – pattern matrix

Pattern Matrix[a]

	Component				
	1	2	3	4	5
I like to participate in real life tasks in the workplace	.874				
I like to discuss issues and scenarios with fellow professionals	.758				
I like to learn about changes or new situations I have encountered in my practice	.754				
I like difficult activities that challenge me to learn new things	.410	-.313			
I like learning activities that can be completed in a short space of time		.768			
I like learning activities that are easy and require little work		.637			.313
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot		-.550		.528	
I am happy just to pass a learning activity; if I get a high mark, that is an added bonus		.509	.368		
I like to do well and get high marks			-.794		
I don't like getting things wrong and try not to make mistakes when I'm learning			-.783		
I like to get a certificate or credits when I complete a learning activity			-.593	.401	
I like to have a goal to work towards	.367		-.578		
I don't mind making a mistake when I do an activity because I can learn from it				.816	
I like a teacher to present me with all the relevant information					.746
I like to read up about a subject on my own					-.633

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 22 iterations.

Appendix 17. Diagnostic tables - Mastery

Case Processing Summary

		N	%
Cases	Valid	296	70.6
	Excluded[a]	123	29.4
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.746	.762	5

Item Statistics

	Mean	Std. Deviation	N
I like to participate in real life tasks in the workplace	4.0439	.81600	296
I like to discuss issues and scenarios with fellow professionals	3.7973	.96698	296
I like to learn about changes or new situations I have encountered in my practice	4.2230	.59741	296
I like difficult activities that challenge me to learn new things	3.7736	.78510	296
I like to have a goal to work towards	3.9899	.77453	296

Inter-Item Correlation Matrix

	I like to participate in real life tasks in the workplace	I like to discuss issues and scenarios with fellow professionals	I like to learn about changes or new situations I have encountered in my practice	I like difficult activities that challenge me to learn new things	I like to have a goal to work towards
I like to participate in real life tasks in the workplace	1.000	.467	.564	.370	.419
I like to discuss issues and scenarios with fellow professionals	.467	1.000	.378	.292	.187
I like to learn about changes or new situations I have encountered in my practice	.564	.378	1.000	.390	.488
I like difficult activities that challenge me to learn new things	.370	.292	.390	1.000	.353
I like to have a goal to work towards	.419	.187	.488	.353	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.391	.187	.564	.377	3.010	.010	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I like to participate in real life tasks in the workplace	15.7838	4.916	.633	.427	.653
I like to discuss issues and scenarios with fellow professionals	16.0304	5.040	.437	.253	.741
I like to learn about changes or new situations I have encountered in my practice	15.6047	5.711	.632	.426	.676
I like difficult activities that challenge me to learn new things	16.0541	5.543	.463	.221	.718
I like to have a goal to work towards	15.8378	5.580	.462	.295	.718

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
19.8277	7.872	2.80569	5

Appendix 18. Diagnostic tables - Effort

Case Processing Summary

		N	%
Cases	Valid	299	71.4
	Excluded[a]	120	28.6
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.615	.614	5

Item Statistics

	Mean	Std. Deviation	N
I like difficult activities that challenge me to learn new things	3.7726	.78692	299
Flipped I like learning activities that can be completed in a short space of time	1.9498	.60270	299
Flipped I like learning activities that are easy	3.0435	.95965	299
Flipped I am happy just to pass a learning activity	3.2642	1.05253	299
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	3.4415	1.01619	299

Inter-Item Correlation Matrix

	I like difficult activities that challenge me to learn new things	Flipped I like learning activities that can be completed in a short space of time	Flipped I like learning activities that are easy	Flipped I am happy just to pass a learning activity	I don't mind activities that take a long time to complete if I know that eventually I will learn a lot
I like difficult activities that challenge me to learn new things	1.000	.068	.293	.190	.382
Flipped I like learning activities that can be completed in a short space of time	.068	1.000	.323	.137	.184
Flipped I like learning activities that are easy	.293	.323	1.000	.391	.228
Flipped I am happy just to pass a learning activity	.190	.137	.391	1.000	.220
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	.382	.184	.228	.220	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.242	.068	.391	.323	5.757	.010	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
I like difficult activities that challenge me to learn new things	11.6990	5.902	.375	.196	.560
Flipped I like learning activities that can be completed in a short space of time	13.5217	6.754	.267	.122	.607
Flipped I like learning activities that are easy	12.4281	4.984	.478	.272	.498
Flipped I am happy just to pass a learning activity	12.2074	5.098	.368	.172	.565
I don't mind activities that take a long time to complete if I know that eventually I will learn a lot	12.0301	5.170	.379	.189	.557

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
15.4716	7.955	2.82041	5

Appendix 19. Diagnostic tables - Performance

Case Processing Summary

		N	%
Cases	Valid	297	70.9
	Excluded[a]	122	29.1
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.681	.701	5

Item Statistics

	Mean	Std. Deviation	N
Flipped I am happy just to pass a learning activity	3.2525	1.04955	297
I like to do well and get high marks	4.0640	.82565	297
I don't like getting things wrong and try not to make mistakes when I'm learning	3.8384	.93405	297
I like to get a certificate or credits when I complete a learning activity	3.8215	.86122	297
I like to have a goal to work towards	3.9933	.77107	297

Inter-Item Correlation Matrix

	Flipped I am happy just to pass a learning activity	I like to do well and get high marks	I like to get a certificate or credits when I complete a learning activity	I don't like getting things wrong and try not to make mistakes when I'm learning	I like to have a goal to work towards
Flipped I am happy just to pass a learning activity	1.000	.313	.039	.142	.319
I like to do well and get high marks	.313	1.000	.377	.460	.606
I don't like getting things wrong and try not to make mistakes when I'm learning	.142	.460	.266	1.000	.313
I like to get a certificate or credits when I complete a learning activity	.039	.377	1.000	.266	.359
I like to have a goal to work towards	.319	.606	.359	.313	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.319	.039	.606	.567	15.605	.023	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Flipped I am happy just to pass a learning activity	15.7172	6.264	.268	.138	.718
I like to do well and get high marks	14.9057	5.532	.659	.479	.535
I don't like getting things wrong and try not to make mistakes when I'm learning	15.1313	6.033	.407	.223	.644
I like to get a certificate or credits when I complete a learning activity	15.1481	6.519	.344	.191	.669
I like to have a goal to work towards	14.9764	5.962	.588	.410	.574

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
18.9697	8.773	2.96188	5

Appendix 20. Correlation matrix – pharmacists' attitudes towards pharmacy practice (8 questions)

Correlation Matrix

	Pharmacists should maintain their current roles	Pharmacists should take on some additional roles that were traditionally done by doctors	Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	Flipped pharmacists should not take on any additional roles	Pharmacy technicians should maintain their current roles	Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	Flipped techs should not take on any additional roles
Pharmacists should maintain their current roles	1.000	-.083	-.163	-.218	.616	-.102	-.113	-.182
Pharmacists should take on some additional roles that were traditionally done by doctors	-.083	1.000	.198	.444	-.005	.255	.157	.325
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	-.163	.198	1.000	.236	-.260	.664	.346	.465
Flipped pharmacists should not take on any additional roles	-.218	.444	.236	1.000	-.188	.191	.098	.468
Pharmacy technicians should maintain their current roles	.616	-.005	-.260	-.188	1.000	-.273	-.189	-.309
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	-.102	.255	.664	.191	-.273	1.000	.433	.644
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	-.113	.157	.346	.098	-.189	.433	1.000	.341
Flipped techs should not take on any additional roles	-.182	.325	.465	.468	-.309	.644	.341	1.000

Appendix 21. Pharmacists' attitudes towards pharmacy practice - communalities

Communalities

	Initial	Extraction
Pharmacists should maintain their current roles	1.000	.816
Pharmacists should take on some additional roles that were traditionally done by doctors	1.000	.687
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	1.000	.648
Flipped pharmacists should not take on any additional roles	1.000	.753
Pharmacy technicians should maintain their current roles	1.000	.813
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	1.000	.805
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	1.000	.474
Flipped techs should not take on any additional roles	1.000	.679

Extraction Method: Principal Component Analysis.

Appendix 22. Pharmacists' attitudes towards pharmacy practice – total variance

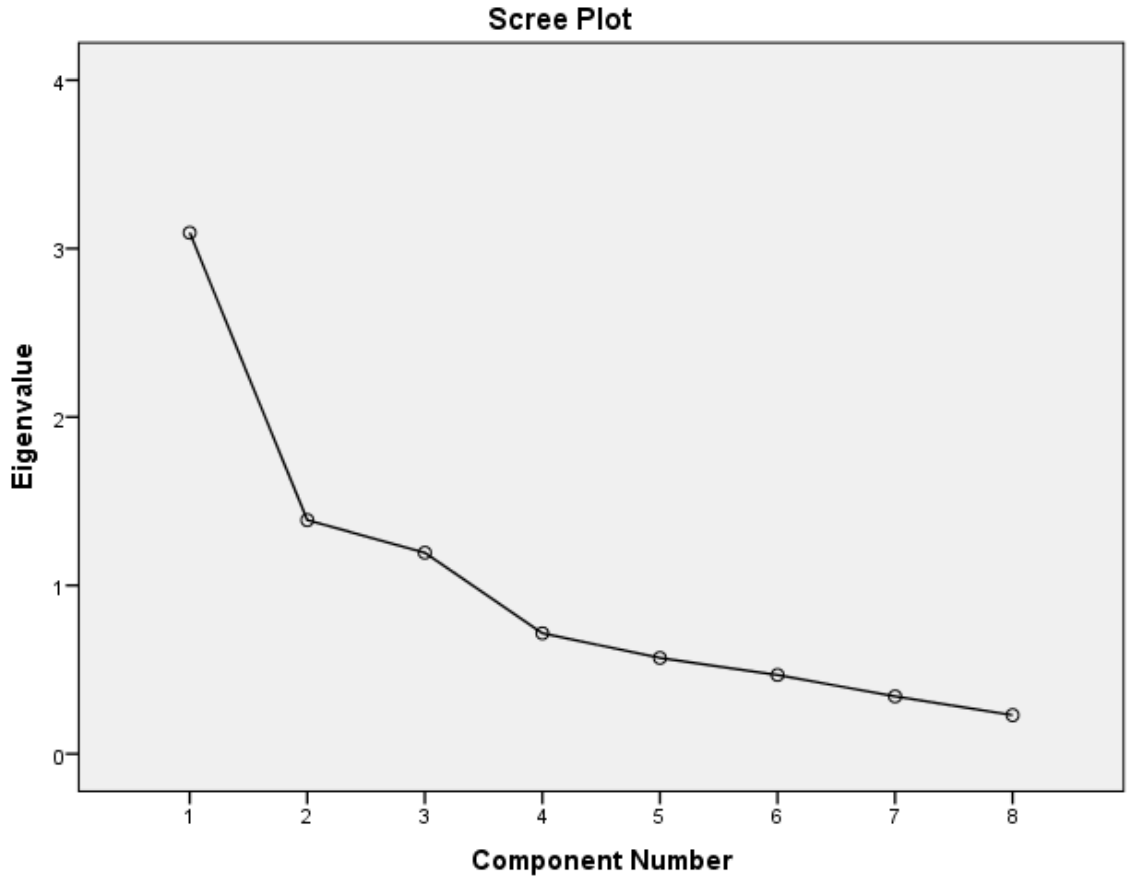
Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.094	38.670	38.670	3.094	38.670	38.670	2.652
2	1.388	17.350	56.020	1.388	17.350	56.020	1.862
3	1.194	14.927	70.948	1.194	14.927	70.948	1.901
4	.716	8.950	79.898				
5	.569	7.117	87.014				
6	.468	5.852	92.867				
7	.341	4.263	97.130				
8	.230	2.870	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Appendix 23. Scree plot: pharmacists' attitudes towards pharmacy practice (8 items)



Appendix 24. Pharmacists' attitudes towards pharmacy practice – component matrix

Component Matrix[a]

	Component		
	1	2	3
Flipped techs should not take on any additional roles	.806		
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	.789		-.342
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	.726		-.308
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	.547		-.392
Pharmacists should maintain their current roles	-.429	.782	
Pharmacy technicians should maintain their current roles	-.538	.719	
Flipped pharmacists should not take on any additional roles	.552		.667
Pharmacists should take on some additional roles that were traditionally done by doctors	.466	.340	.595

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Appendix 25. Pharmacists' attitudes towards pharmacy practice – structure matrix

Structure Matrix

	Component		
	1	2	3
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	.896		
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	.803		
Flipped techs should not take on any additional roles	.720		.568
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	.679		
Pharmacists should maintain their current roles		.897	
Pharmacy technicians should maintain their current roles	-.328	.889	
Flipped pharmacists should not take on any additional roles			.853
Pharmacists should take on some additional roles that were traditionally done by doctors			.817

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Appendix 26. Pharmacists' attitudes towards pharmacy practice – pattern matrix

Pattern Matrix[a]

	Component		
	1	2	3
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	.890		
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	.786		
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	.712		
Flipped techs should not take on any additional roles	.593		.396
Pharmacists should maintain their current roles		.911	
Pharmacy technicians should maintain their current roles		.867	
Flipped pharmacists should not take on any additional roles			.842
Pharmacists should take on some additional roles that were traditionally done by doctors			.825

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 5 iterations.

Appendix 27. Diagnostic tables - Improve skill mix

Case Processing Summary

		N	%
Cases	Valid	282	67.3
	Excluded[a]	137	32.7
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.784	.789	4

Item Statistics

	Mean	Std. Deviation	N
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	3.8582	.88145	282
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	3.9291	.82785	282
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	3.5355	.96587	282
Flipped techs should not take on any additional roles	3.9255	.95715	282

Inter-Item Correlation Matrix

	Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	Flipped techs should not take on any additional roles
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	1.000	.664	.432	.645
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	.664	1.000	.346	.465
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	.432	.346	1.000	.344
Flipped techs should not take on any additional roles	.645	.465	.344	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.483	.344	.664	.321	1.933	.018	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Pharmacy technicians should take on some additional roles that were traditionally done by pharmacists	11.3901	4.459	.751	.604	.648
Some of the roles that pharmacists do should be done by appropriately trained pharmacy technicians	11.3191	5.086	.605	.447	.726
Some of the roles that pharmacy technicians do should be done by appropriately trained pharmacy assistants	11.7128	5.173	.438	.199	.810
Flipped techs should not take on any additional roles	11.3227	4.654	.596	.424	.728

Appendix 28. Diagnostic tables - Maintain current roles

Case Processing Summary

		N	%
Cases	Valid	286	68.3
	Excluded[a]	133	31.7
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.760	.763	2

Item Statistics

	Mean	Std. Deviation	N
Pharmacists should maintain their current roles	3.1224	1.14358	286
Pharmacy technicians should maintain their current roles	3.0629	1.03427	286

Inter-Item Correlation Matrix

	Pharmacists should maintain their current roles	Pharmacy technicians should maintain their current roles
Pharmacists should maintain their current roles	1.000	.616
Pharmacy technicians should maintain their current roles	.616	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.616	.616	.616	.000	1.000	.000	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Pharmacists should maintain their current roles	3.0629	1.070	.616	.380	.
Pharmacy technicians should maintain their current roles	3.1224	1.308	.616	.380	.

Appendix 29. Diagnostic tables - Extend roles

Case Processing Summary

		N	%
Cases	Valid	284	67.8
	Excluded[a]	135	32.2
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.671	.678	3

Item Statistics

	Mean	Std. Deviation	N
Flipped techs should not take on any additional roles	3.9225	.95536	284
Flipped pharmacists should not take on any additional roles	4.3239	.77550	284
Pharmacists should take on some additional roles that were traditionally done by doctors	4.1690	.81481	284

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.413	.326	.468	.142	1.438	.005	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Flipped techs should not take on any additional roles	8.4930	1.827	.465	.236	.615
Flipped pharmacists should not take on any additional roles	8.0915	2.083	.561	.314	.487
Pharmacists should take on some additional roles that were traditionally done by doctors	8.2465	2.208	.441	.215	.628

Appendix 30. Diagnostic tables – Expansive environment

Case Processing Summary

		N	%
Cases	Valid	370	88.3
	Excluded[a]	49	11.7
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.786	.786	3

Item Statistics

	Mean	Std. Deviation	N
A high value is placed on developing all staff	3.6270	1.06754	370
Staff development focuses on helping individuals to progress in their career	3.2270	1.03715	370
Staff have access to a broad range of learning & development activities relating to the pharmacy service as a whole	3.2865	1.03807	370

Inter-Item Correlation Matrix

	A high value is placed on developing all staff	Staff development focuses on helping individuals to progress in their career	Staff have access to a broad range of learning & development activities relating to the pharmacy service as a whole
A high value is placed on developing all staff	1.000	.620	.556
Staff development focuses on helping individuals to progress in their career	.620	1.000	.473
Staff have access to a broad range of learning & development activities relating to the pharmacy service as a whole	.556	.473	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.550	.473	.620	.147	1.311	.004	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
A high value is placed on developing all staff	6.5135	3.172	.685	.474	.642
Staff development focuses on helping individuals to progress in their career	6.9135	3.450	.621	.408	.715
Staff have access to a broad range of learning & development activities relating to the pharmacy service as a whole	6.8541	3.588	.573	.336	.765

Appendix 31. Diagnostic tables – Restrictive environment

Case Processing Summary

		N	%
Cases	Valid	370	88.3
	Excluded[a]	49	11.7
	Total	419	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.123	.085	3

Item Statistics

	Mean	Std. Deviation	N
Service provision takes priority over staff development	3.8297	.96310	370
Staff development focuses on helping individuals to do their current job	3.6514	.85544	370
Staff have access to a narrow range of learning & development activities relating mainly to their current job	2.9432	1.06916	370

Inter-Item Correlation Matrix

	Service provision takes priority over staff development	Staff development focuses on helping individuals to do their current job	Staff have access to a narrow range of learning & development activities relating mainly to their current job
Service provision takes priority over staff development	1.000	-.059	.322
Staff development focuses on helping individuals to do their current job	-.059	1.000	-.173
Staff have access to a narrow range of learning & development activities relating mainly to their current job	.322	-.173	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.030	-.173	.322	.495	-1.864	.054	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Service provision takes priority over staff development	6.5946	1.559	.235	.104	-.406[a]
Staff development focuses on helping individuals to do their current job	6.7730	2.734	-.146	.030	.485
Staff have access to a narrow range of learning & development activities relating mainly to their current job	7.4811	1.562	.130	.128	-.125[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Appendix 32. Multinomial logistic regression - the impact of pharmacists' attitudes on the 'type of learning' geocode

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	872.978			
Final	789.360	83.618	25	.000

Pseudo R-Square

Cox and Snell	.275
Nagelkerke	.285
McFadden	.096

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	811.289	21.929	5	.001
Mastery	814.895	25.535	5	.000
Performance	795.052	5.692	5	.337
Improve_skill_mix	797.045	7.684	5	.175
Maintain_current_roles	806.451	17.090	5	.004
Expansive_environment	811.243	21.883	5	.001

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Parameter Estimates

Type of learning geocode[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Geo_unstructured	Intercept	.135	1.012	.018	1	.894			
	Mastery	-.831	.336	6.123	1	.013	.435	.225	.841
	Performance	.099	.270	.135	1	.713	1.104	.651	1.875
	Improve_skill_mix	-.343	.354	.937	1	.333	.710	.355	1.421
	Maintain_current_roles	1.214	.335	13.155	1	.000	3.365	1.747	6.484
	Expansive_environment	.178	.349	.262	1	.609	1.195	.604	2.367
Geo_semistructured	Intercept	2.604	.777	11.219	1	.001			
	Mastery	-.524	.279	3.515	1	.061	.592	.343	1.024
	Performance	.353	.212	2.787	1	.095	1.424	.940	2.156
	Improve_skill_mix	-.527	.307	2.951	1	.086	.591	.324	1.077
	Maintain_current_roles	.370	.254	2.119	1	.145	1.448	.880	2.382
	Expansive_environment	-.052	.263	.039	1	.843	.949	.567	1.591
Geo_CE	Intercept	1.777	.844	4.434	1	.035			
	Mastery	-.110	.304	.130	1	.718	.896	.494	1.625
	Performance	.281	.232	1.471	1	.225	1.325	.841	2.087
	Improve_skill_mix	-.425	.323	1.732	1	.188	.654	.347	1.231
	Maintain_current_roles	.607	.274	4.901	1	.027	1.835	1.072	3.139
	Expansive_environment	-.549	.279	3.887	1	.049	.577	.334	.997

Geo_NMP	Intercept	.807	.869	.863	1	.353			
	Mastery	.342	.319	1.148	1	.284	1.408	.753	2.632
	Performance	.089	.232	.148	1	.701	1.093	.694	1.723
	Improve_skill_mix	-.021	.345	.004	1	.951	.979	.498	1.925
	Maintain_current_roles	.435	.273	2.535	1	.111	1.546	.904	2.642
	Expansive_environment	-.713	.281	6.429	1	.011	.490	.283	.851
Geo_WBL	Intercept	1.490	.899	2.745	1	.098			
	Mastery	.279	.347	.644	1	.422	1.321	.669	2.610
	Performance	.399	.251	2.532	1	.112	1.491	.912	2.437
	Improve_skill_mix	-.110	.361	.092	1	.761	.896	.442	1.817
	Maintain_current_roles	.491	.293	2.817	1	.093	1.634	.921	2.901
	Expansive_environment	-.672	.305	4.848	1	.028	.511	.281	.929

a. The reference category is: Geo_Doctorate.

Appendix 33. Post hoc Scheffé test: 'A high value is placed on developing all staff' by main sector of work

Descriptives

Value_sector1

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Community	181	3.6961	1.07053	.07957	3.5391	3.8531	1.00	5.00
Hospital	135	3.4741	1.09155	.09395	3.2883	3.6599	1.00	5.00
Primary care	20	3.3500	.93330	.20869	2.9132	3.7868	2.00	5.00
Academia	17	4.5294	.62426	.15141	4.2084	4.8504	3.00	5.00
Industry	2	3.5000	2.12132	1.50000	-15.5593	22.5593	2.00	5.00
Other (please give details below)	17	3.7059	.77174	.18718	3.3091	4.1027	2.00	5.00
Total	372	3.6344	1.06687	.05531	3.5256	3.7432	1.00	5.00

ANOVA

Value_sector1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.518	5	3.904	3.547	.004
Within Groups	402.761	366	1.100		
Total	422.280	371			

Multiple Comparisons

Dependent Variable: Value_sector1

Scheffe

(I) In which sector of pharmacy is your first place of work (please select ONE)?	(J) In which sector of pharmacy is your first place of work (please select ONE)?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Community	Hospital	.22206	.11929	.629	-.1771	.6212
	Primary care	.34613	.24719	.854	-.4809	1.1731
	Academia	-.83328	.26610	.084	-1.7236	.0570
	Industry	.19613	.74586	1.000	-2.2992	2.6915
	Other (please give details below)	-.00975	.26610	1.000	-.9000	.8805
Hospital	Community	-.22206	.11929	.629	-.6212	.1771
	Primary care	.12407	.25134	.999	-.7168	.9650
	Academia	-1.05534*	.26997	.010	-1.9586	-.1521
	Industry	-.02593	.74724	1.000	-2.5259	2.4741
	Other (please give details below)	-.23181	.26997	.981	-1.1350	.6714
Primary care	Community	-.34613	.24719	.854	-1.1731	.4809
	Hospital	-.12407	.25134	.999	-.9650	.7168
	Academia	-1.17941*	.34605	.043	-2.3372	-.0216
	Industry	-.15000	.77797	1.000	-2.7528	2.4528
	Other (please give details below)	-.35588	.34605	.958	-1.5137	.8019

Academia	Community	.83328	.26610	.084	-.0570	1.7236
	Hospital	1.05534*	.26997	.010	.1521	1.9586
	Primary care	1.17941*	.34605	.043	.0216	2.3372
	Industry	1.02941	.78419	.886	-1.5942	3.6530
	Other (please give details below)	.82353	.35981	.389	-.3803	2.0273
Industry	Community	-.19613	.74586	1.000	-2.6915	2.2992
	Hospital	.02593	.74724	1.000	-2.4741	2.5259
	Primary care	.15000	.77797	1.000	-2.4528	2.7528
	Academia	-1.02941	.78419	.886	-3.6530	1.5942
	Other (please give details below)	-.20588	.78419	1.000	-2.8295	2.4177
Other (please give details below)	Community	.00975	.26610	1.000	-.8805	.9000
	Hospital	.23181	.26997	.981	-.6714	1.1350
	Primary care	.35588	.34605	.958	-.8019	1.5137
	Academia	-.82353	.35981	.389	-2.0273	.3803
	Industry	.20588	.78419	1.000	-2.4177	2.8295

*. The mean difference is significant at the 0.05 level.

Value_sector1

Scheffe[a,b]

In which sector of pharmacy is your first place of work (please select ONE)?	N	Subset for alpha = 0.05
		1
Primary care	20	3.3500
Hospital	135	3.4741
Industry	2	3.5000
Community	181	3.6961
Other (please give details below)	17	3.7059
Academia	17	4.5294
Sig.		.352

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 8.816.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Appendix 34. Post hoc Scheffé test: 'Staff development focuses on helping individuals to progress in their career' by main sector of work

Descriptives

Progress_sector1

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Community	178	3.3371	1.05170	.07883	3.1815	3.4926	1.00	5.00
Hospital	136	3.0441	1.03185	.08848	2.8691	3.2191	1.00	5.00
Primary care	20	3.0500	.99868	.22331	2.5826	3.5174	2.00	5.00
Academia	17	3.9412	.65865	.15975	3.6025	4.2798	2.00	5.00
Industry	2	3.5000	.70711	.50000	-2.8531	9.8531	3.00	4.00
Other (please give details below)	17	3.1176	.78121	.18947	2.7160	3.5193	2.00	4.00
Total	370	3.2324	1.03071	.05358	3.1271	3.3378	1.00	5.00

ANOVA

Progress_sector1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.344	5	3.269	3.167	.008
Within Groups	375.666	364	1.032		
Total	392.011	369			

Multiple Comparisons

Dependent Variable: Progress_sector1

Scheffe

(I) In which sector of pharmacy is your first place of work (please select ONE)?	(J) In which sector of pharmacy is your first place of work (please select ONE)?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Community	Hospital	.29296	.11570	.271	-.0941	.6801
	Primary care	.28708	.23958	.920	-.5145	1.0887
	Academia	-.60410	.25789	.361	-1.4669	.2587
	Industry	-.16292	.72237	1.000	-2.5798	2.2539
	Other (please give details below)	.21943	.25789	.981	-.6434	1.0823
Hospital	Community	-.29296	.11570	.271	-.6801	.0941
	Primary care	-.00588	.24329	1.000	-.8199	.8081
	Academia	-.89706*	.26134	.040	-1.7714	-.0227
	Industry	-.45588	.72361	.995	-2.8769	1.9651
	Other (please give details below)	-.07353	.26134	1.000	-.9479	.8008
Primary care	Community	-.28708	.23958	.920	-1.0887	.5145
	Hospital	.00588	.24329	1.000	-.8081	.8199
	Academia	-.89118	.33513	.218	-2.0124	.2301
	Industry	-.45000	.75341	.996	-2.9707	2.0707
	Other (please give details below)	-.06765	.33513	1.000	-1.1889	1.0536

Academia	Community	.60410	.25789	.361	-.2587	1.4669
	Hospital	.89706*	.26134	.040	.0227	1.7714
	Primary care	.89118	.33513	.218	-.2301	2.0124
	Industry	.44118	.75943	.997	-2.0997	2.9820
	Other (please give details below)	.82353	.34845	.351	-.3423	1.9894
Industry	Community	.16292	.72237	1.000	-2.2539	2.5798
	Hospital	.45588	.72361	.995	-1.9651	2.8769
	Primary care	.45000	.75341	.996	-2.0707	2.9707
	Academia	-.44118	.75943	.997	-2.9820	2.0997
	Other (please give details below)	.38235	.75943	.998	-2.1585	2.9232
Other (please give details below)	Community	-.21943	.25789	.981	-1.0823	.6434
	Hospital	.07353	.26134	1.000	-.8008	.9479
	Primary care	.06765	.33513	1.000	-1.0536	1.1889
	Academia	-.82353	.34845	.351	-1.9894	.3423
	Industry	-.38235	.75943	.998	-2.9232	2.1585

*. The mean difference is significant at the 0.05 level.

Progress_sector1

Scheffe[a,b]

In which sector of pharmacy is your first place of work (please select ONE)?	N	Subset for alpha = 0.05
		1
Hospital	136	3.0441
Primary care	20	3.0500
Other (please give details below)	17	3.1176
Community	178	3.3371
Industry	2	3.5000
Academia	17	3.9412
Sig.		.633

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 8.816.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Appendix 35. Multinomial logistic regression – the impact of pharmacists' attitudes on the 'type of professional practice' geocode

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	699.477			
Final	650.567	48.909	25	.003

Pseudo R-Square

Cox and Snell	.203
Nagelkerke	.212
McFadden	.070

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	663.993	13.426	5	.020
Mastery	663.814	13.247	5	.021
Performance	654.492	3.924	5	.560
Improve_skill_mix	658.553	7.986	5	.157
Maintain_current_roles	660.727	10.160	5	.071
Expansive_environment	656.360	5.793	5	.327

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

Parameter Estimates

Grouped practice geocode[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Semi_prof	Intercept	-3.889	1.641	5.613	1	.018			
	Mastery	-1.380	.495	7.770	1	.005	.252	.095	.664
	Performance	-.670	.407	2.711	1	.100	.512	.230	1.136
	Improve_skill_mix	-.485	.549	.778	1	.378	.616	.210	1.808
	Maintain_current_roles	.436	.540	.653	1	.419	1.547	.537	4.453
	Expansive_environment	-.329	.458	.516	1	.473	.720	.293	1.767
Prof_tech	Intercept	-.006	1.019	.000	1	.995			
	Mastery	-.611	.367	2.774	1	.096	.543	.265	1.114
	Performance	.021	.299	.005	1	.945	1.021	.568	1.836
	Improve_skill_mix	-.409	.382	1.150	1	.284	.664	.314	1.404
	Maintain_current_roles	.588	.351	2.800	1	.094	1.800	.904	3.584
	Expansive_environment	.122	.332	.136	1	.712	1.130	.590	2.166
Prof_pharm	Intercept	.726	.848	.733	1	.392			
	Mastery	-.042	.310	.018	1	.892	.959	.522	1.760
	Performance	-.059	.247	.058	1	.810	.942	.580	1.530
	Improve_skill_mix	-.492	.330	2.226	1	.136	.612	.321	1.167
	Maintain_current_roles	.840	.286	8.614	1	.003	2.316	1.322	4.058
	Expansive_environment	-.043	.267	.026	1	.873	.958	.568	1.617

Ext_prac	Intercept	.613	.797	.591	1	.442			
	Mastery	-.108	.295	.135	1	.713	.897	.504	1.599
	Performance	-.145	.230	.399	1	.527	.865	.551	1.357
	Improve_skill_mix	.080	.335	.057	1	.811	1.084	.562	2.090
	Maintain_current_roles	.437	.269	2.638	1	.104	1.548	.914	2.622
	Expansive_environment	-.251	.252	.990	1	.320	.778	.475	1.275
Adv_serv	Intercept	.288	.840	.118	1	.732			
	Mastery	-.101	.305	.109	1	.742	.904	.497	1.645
	Performance	-.178	.242	.540	1	.462	.837	.521	1.344
	Improve_skill_mix	-.207	.337	.378	1	.539	.813	.419	1.575
	Maintain_current_roles	.507	.280	3.284	1	.070	1.660	.960	2.871
	Expansive_environment	.186	.270	.476	1	.490	1.205	.709	2.047

a. The reference category is: Adv_Ext.

Classification

Observed	Predicted						
	Semi_prof	Prof_tech	Prof_pharm	Ext_prac	Adv_serv	Adv_Ext	Percent Correct
Semi_prof	2	0	3	3	0	0	25.0%
Prof_tech	0	0	9	7	3	1	0.0%
Prof_pharm	0	3	22	17	11	0	41.5%
Ext_prac	0	1	14	42	5	0	67.7%
Adv_serv	0	1	14	23	9	1	18.8%
Adv_Ext	0	1	1	16	4	2	8.3%
Overall Percentage	0.9%	2.8%	29.3%	50.2%	14.9%	1.9%	35.8%

Appendix 36. Binary logistic regression - the impact of pharmacists' attitudes on 'some extended practice' geocode

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	19.213	5	.002
	Block	19.213	5	.002
	Model	19.213	5	.002

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	270.182[a]	.085	.116

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	7.790	8	.454

Contingency Table for Hosmer and Lemeshow Test

		Some extended practice = .00		Some extended practice = 1.00		Total
		Observed	Expected	Observed	Expected	
Step 1	1	20	18.718	2	3.282	22
	2	16	16.383	6	5.617	22
	3	11	15.100	11	6.900	22
	4	16	14.398	6	7.602	22
	5	14	13.820	8	8.180	22
	6	15	12.946	7	9.054	22
	7	11	11.712	11	10.288	22
	8	8	10.725	14	11.275	22
	9	11	9.448	11	12.552	22
	10	7	5.749	10	11.251	17

Classification Table[a]

			Predicted		
			Some extended practice		Percentage Correct
	Observed		.00	1.00	
Step 1	Some extended practice	.00	105	24	81.4
		1.00	55	31	36.0
	Overall Percentage				63.3

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Mastery	.158	.171	.853	1	.356	1.171
	Performance	.024	.141	.028	1	.866	1.024
	Improve_skill_mix	.435	.184	5.599	1	.018	1.545
	Maintain_current_roles	-.319	.151	4.480	1	.034	.727
	Expansive_environment	-.250	.149	2.828	1	.093	.779
	Constant	-.392	.491	.639	1	.424	.675

a. Variable(s) entered on step 1: Mastery, Performance, Improve_skill_mix, Maintain_current_roles, Expansive_environment.