UMEÅ UNIVERSITY

Teaching in an age of complexity

Exploring academic change and development in higher education

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Umeå 2018

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Dissertation for PhD
ISBN: 978-91-7601-833-0
ISSN 0281-6768

Electronic version available at: http://umu.diva-portal.org/
Printed by: UmU Print Service, Umeå University
Umeå, Sweden, 2018

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Abstract

Higher education (HE) has expanded and diversified at an unprecedented rate over the last two decades in response to a rapidly changing educational and political climate. Change and development are omnipresent, a constant part of university teachers' sociocultural and organisational practice at multiple levels; the micro-level, the meso-level and the macro-level. Against this background, the aim of this thesis is to gain a deeper understanding of the factors that influence academic change. A further aim of the thesis is to provide insight into factors that may be relevant in the design of academic development activities to support teachers and managers in the enhancement of teaching and learning. A twelve-year longitudinal study of teachers on an online pharmacy programme forms the basis for the research, where a multilevel approach is used to investigate academic change and development in a teaching and learning environment supported by educational technology (Edtech). The approach captures the influence of factors such as conceptions and approaches to teaching at the micro-level of the individual teacher, as well as the influence of systemic factors such as the sociocultural context at the meso-level of the department or programme and the structural context at the macro-level of the institution.

To explore and understand the complexity of change and development in academic practice at micro-, meso- and macro-level two complementary theoretical frameworks are used: conceptions of and approaches to teaching (CAT), and Cultural-Historical Activity Theory (CHAT). An interventionist method based on the tenets of CHAT was also employed. Data analysed in the thesis includes interviews with teachers (n=57), observations (n=27 hours), student evaluation surveys (n=30) and document analysis (n=11) collected over a twelve-year timespan (2004-2016). The analysis indicated that at the micro-level a critical factor in the choice and use of Edtech is the underlying conception of and approach to teaching and learning of the teacher. Opportunities for change and development were found to be facilitated by the sociocultural context at the meso-level of the department, where support from the community and mediating tools for communication were present but could also be hindered when this was lacking. At macro-level, institutional policy and strategy were seen to impede change and development, when research is consistently prioritised over teaching. At the meso-level of the department or programme, the opportunity to work together as a team to collaboratively construct and develop practice was found to be of significance in the development of agency and academic practice.

Taking into account a combined analysis of the five papers included in the thesis, it can be concluded that if a deeper understanding of academic change and development is to be achieved, it is necessary to adopt a holistic approach,

considering factors at micro-, meso- and macro-level and the interrelationships between these factors. This thesis discusses the consequences of the research for the facilitation of academic change and development. A multilevel, holistic approach is suggested, building on the principles of the Scholarship of Teaching and Learning (SoTL) model. SoTL initiatives at all levels should be aligned to promote academic change and development through: the development of teachers' individual practice at micro-level, the collaborative development of scholarly practice at the meso-level of the department and a strategic institutional approach at macro-level linking SoTL to employment and promotion frameworks and the recognition of teaching quality.

The main contribution of this thesis lies in the adoption of a holistic approach to understanding academic practice in higher education, taking into consideration factors at micro-, meso- and macro-level and the interrelationships between these factors.

Sammanfattning

Det akademiska landskapet har expanderat och diversifierats i snabb takt under de senaste två decennierna. Detta på grund av stora förändringar i det pedagogiska såväl som det politiska klimatet. Förändring och utveckling är en ständigt pågående del av universitetslärarnas sociokulturella och organisatoriska praktik på flera nivåer: på mikronivå, mesonivå och makronivå. Mot denna bakgrund är syftet med avhandlingen att utveckla en djupare förståelse för de faktorer som påverkar akademisk förändring. Vidare är syftet att bidra med förståelse för faktorer som kan vara relevanta vid utformandet av en akademisk verksamhet som ska stödja lärare och chefer att förbättra både undervisning och lärande. En longitudinell studie av lärare på ett nätbaserat apotekarprogram utgör den empiriska grunden för avhandlingen. Studien har genomförts under en 12-årsperiod (2004 - 2016). En holistisk metod har tillämpats för att kunna undersöka akademisk förändring och utveckling i en undervisnings- och lärandemiljö som stöds av informations- och kommunikationsteknologi (IKT). Metoden har valts för att närmare kunna studera: betydelsen av faktorer som begreppsläggning och undervisningsdesign på den individuella lärarens mikronivå; betydelsen av systemfaktorer som den sociokulturella kontexten på institutionens eller programmets mesonivå; samt strukturella sammanhang på institutionens makronivå.

För att på mikro-, meso- och makronivå kunna studera och förstå komplexiteten i en akademisk praktik har två teoretiska ramverk applicerats: begrepp och förhållningssätt till undervisning (i avhandlingen förkortat CAT) och kulturhistorisk aktivitetsteori (i avhandlingen förkortat CHAT). Avhandlingens empiri består av intervjuer med lärare (n = 57), observationer (n = 27 timmar), studentutvärderingsundersökningar (n = 30) samt policydokument (n = 11). Analysen visar att en kritisk faktor i val och tillämpning av IKT i undervisning på mikronivå är lärarens underliggande syn på lärande och undervisning. På mesonivå, framkom att lärarens möjligheter till förändring och utveckling underlättades av den sociokulturella kontexten på institutionen, där stöd från kollegor och medierande kommunikationsverktyg fanns tillgängligt, men när detta saknades hindrades istället både förändring och utveckling. På institutionens eller programmets mesonivå visade det sig vara betydelsefullt om det fanns möjlighet för lärarna att arbeta tillsammans med att gemensamt utveckla deras akademiska praktik. På makronivå kunde förändring och utveckling hindras av institutionell politik och reglerande policydokument, till exempel när forskning konsekvent prioriterades framför undervisning.

I avhandlingen ingår fem artiklar. En kombinerad analys av dessa fem inkluderade visar att om en djupare förståelse för akademisk förändring och

utveckling ska utvecklas så är det centralt att anamma en helhetssyn som tar hänsyn till faktorer på mikro-, meso- och makronivå, samt relationerna mellan dessa faktorer. Utifrån avhandlingens resultat diskuteras design av pedagogiska utvecklingsaktiviteter och hur de kan bidra till akademisk förändring och utveckling. Ett holistiskt tillvägagångssätt som bygger på principerna för Scholarship of Teaching and Learning (SoTL) föreslås. SoTL-initiativ på alla tre nivåer har potential att främja akademisk förändring och utveckling genom: utveckling av lärarnas individuella praktik på mikronivå, kollaborativ utveckling av akademisk praktik på institutionens mesonivå samt en genomtänkt institutionell strategi på makronivå som kopplar SoTL till anställnings- och befordringsramar och som identifierar och belönar undervisningskvalitet.

Avhandlingens huvudsakliga kunskapsbidrag är att den pekar ut betydelsen av att anamma en helhetssyn för att förstå akademisk praktik inom högre utbildning, genom att beakta faktorer på mikro-, meso- och makronivå samt relationerna mellan dessa faktorer.

Glossary of abbreviations

BSc Pharm	Bachelor of Science in Pharmacy
MPharm	Master's Programme in Pharmaceutical Science
MSc Pharm	Master of Science in Pharmacy
BERA	British Educational Research Association
CAT	Conceptions and Approaches to Teaching and Learning
CEQ	Course Experience Questionnaire
CHAT	Cultural-Historical Activity Theory
CL	Change Laboratory
Edtech	Educational technology
HE	Higher Education
MOOC	Massive Open Online Courses
OpenSim	OpenSimulator, open source virtual world software
PhD	Doctor of Philosophy
SoTL	Scholarship of Teaching and Learning
VLE	Virtual Learning Environment
Wiki	Collaborative website
3DVW	Three-Dimensional Virtual Worlds

Acknowledgements

This PhD process has been a long and winding journey with many unforeseen interruptions and diversions - but finally the end is in sight. As this PhD project nears its end, there are many people I would like to thank for helping me along the way. I would like to express my gratitude first and foremost to my supervisors, Anders D. Olofsson and Linda Price, who have expertly and patiently guided me on this journey of exploration. Anders, I may not always have appreciated it, but without your eye for detail this thesis would not have been as lucid. Linda, your inspiration and sense of humour have been invaluable; particularly hearing "you're almost finished!" helped me through the final stages.

I also thank my final reader, Keith Trigwell, who provided valuable comments and encouragement and my fellow doctoral students past and present, who were kind enough to read and discuss my work.

My colleagues at the Centre for Educational Development have provided continual support and a more than welcome contact with the practicalities of life as an academic developer. Your coffee room chat has been an essential part of staying sane!

Most of all, my thanks go to the teachers of the online pharmacy programme who gave me access to their work on the programme, answered my questions year after year and willingly participated in virtual worlds and Change Laboratories. Without their help this thesis would not have been possible.

Finally, I owe great thanks to my family and friends who may not always have understood the whys and wherefores of academic development but with great patience and understanding gave me their support and love.

Appended papers

Paper I
Englund, C., Olofsson, A. D., & Price, L. (2016). Teaching with technology in higher education: understanding conceptual change and development in practice. *Higher Education Research & Development, 36*(1), 73-87.

The first author designed the study, collected and analysed the material. All authors wrote the paper together. Reprinted with permission of Taylor & Francis.

Paper II
Englund, C. (2017). Exploring approaches to teaching in three-dimensional virtual worlds. *International Journal of Information and Learning Technology, 34*(2), 140-151.

The author designed the study, collected and analysed the material and wrote the paper. Reprinted with permission av © Emerald Publishing.

Paper III
Englund, C., Olofsson, A. D., & Price, L. Teaching in higher education: contextual factors as facilitators of conceptual change and development in practice. *Under review (submitted to Higher Education, 2nd round of review).*

The first author designed the study, collected and analysed the material. All authors wrote the paper together.

Paper IV
Englund, C. Exploring interdisciplinary academic development: the Change Laboratory as an approach to team-based practice. *(Accepted for publication in Higher Education Research & Development, January 2018).*

The author designed the study, collected and analysed the material and wrote the paper.

Paper V
Englund, C., & Price, L. Facilitating agency: the change laboratory as an intervention for collaborative sustainable development in higher education. *Under review (submitted to International Journal for Academic Development, 2nd round of review).*

The first author designed the study, collected and analysed the material. Both authors wrote the paper together.

1. Introduction

Higher education (HE) has expanded and diversified at an unprecedented rate over the last two decades in response to a rapidly changing educational and political climate (Allais, 2014; Henkel, 2016; Saroyan & Trigwell, 2015). Contributory causes include the increasing use of educational technologies (Edtech)[1], a larger and more diverse student population, internationalisation, marketisation and national quality assurance procedures (Hornsby & Osman, 2014; J. Knight, 2013; Lundahl, Arreman, Holm, & Lundström, 2013; Stensaker, Välimaa, & Sarrico, 2012). These developments are common across the majority of universities in Europe, Sweden being no exception. A perpetually changing academic environment has become an integral part of HE teachers' professional lives (Vähäsantanen, 2015). Change is omnipresent, a constant part of teachers' sociocultural and organisational practice at multiple levels; at the micro-level of the individual, the meso-level of the department or programme and the macro-level of the institution (Hannah & Lester, 2009; Leibowitz, Bozalek, van Schalkwyk, & Winberg, 2014; Nicolini, 2012; Tsoukas & Chia, 2002). However where change can be for the better or worse, development implies a dynamic process that is the result of an intentional action. The increasing demands placed on teachers in HE suggest that it is important to adopt a holistic perspective and to explore both individual, sociocultural and structural factors involved in the development of teaching and learning practices and their interrelationships (Leibowitz, 2015; Price, 2014; Price, Kirkwood, & Richardson, 2016).

The overall intention of this thesis is to explore factors that influence academic change and development in a HE teaching and learning environment supported by Edtech. Further, it hopes to contribute to a deeper understanding of factors that can enhance the design of academic development activities to support teachers and managers in the development of practice in higher education. In this thesis, academic development is understood as the development of teaching and learning at different levels within HE institutions; at micro-, meso- and macro-levels (Hannah & Lester, 2009; Leibowitz, 2014; Mårtensson, Roxå, & Stensaker, 2014).

University teachers undoubtedly face numerous challenges in relation to teaching and learning, however my initial motivation to explore academic change and development arose from a desire to understand the implementation and use of Edtech by HE teachers (Hauge, 2014; Price et al., 2016). From my work as an

[1] "Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources." AECT committee in Januszewski, A., & Molenda, M. (2008). *Educational technology: A definition with commentary*: Routledge.

educational technologist in 2000, to my present position as an academic developer, I have been able to follow developments in the field from early efforts to implement learning management systems to the present almost ubiquitous use of Edtech in HE including the use of virtual worlds for authentic learning experiences (Englund, 2017, paper II in this thesis). Although Edtech has frequently been promoted as having the potential to transform teaching and learning (Conole, 2014; Laurillard, 2008), there seems to be little evidence of pedagogical development facilitated by Edtech (Kirkwood & Price, 2013b; Olofsson & Lindberg, 2014; Price & Kirkwood, 2013; Selwyn, 2010). My initial motivation was therefore to examine factors that could account for this discrepancy between the enthusiastic rhetoric and the reality of Edtech use in HE (Selwyn, 2007). Correspondingly, my intention was also to explore academic development strategies that may facilitate the integration of Edtech in teaching practice and consequently enhance student learning (Ertmer & Ottenbreit-Leftwich, 2013; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010).

A multilevel approach is used in this thesis to investigate academic change and development as it addresses micro-, meso- and macro-levels of the university teaching and learning environment (Hannah & Lester, 2009; Kozlowski & Klein, 2000). The approach captures the influence of factors such as conceptions and approaches to teaching at the micro-level of the individual teacher (Postareff & Lindblom-Ylänne, 2008; Prosser, Trigwell, & Taylor, 1994; Trigwell, Prosser, Martin, & Ramsden, 2005), as well as the influence of systemic factors such as sociocultural and structural context at both the meso-level of the department or programme (Neumann, Parry, & Becher, 2010; Trowler, Saunders, & Bamber, 2012) and the macro-level of the institution (Fanghanel, 2007; Leibowitz et al., 2014). During the longitudinal research process the focus of the thesis has gradually expanded from an exploration of micro-level factors underlying teachers' academic development and integration of Edtech, in papers I and II in the thesis to wider questions concerning academic change and development at meso- and macro-level in papers III, IV and V.

This shift in the focus of the thesis is also echoed in current literature on academic development (Barnett, 2014; Clegg, 2009a; Manathunga, 2011). For example Gibbs (2013) highlights international trends that "involve increased sophistication and understanding of the way change comes about and how it becomes embedded and secure within organisations" (p. 5). Gibbs also discusses a shift in academic development activities from, among other things: a focus on individual teachers to a focus on course teams, departments and leadership; from a focus on teaching to a focus on learning and from small, single, separate tactics to large, complex, integrated, aligned, multiple tactics (pp. 5-9).

To explore factors that may influence academic change and development, a longitudinal study of teachers on an online pharmacy programme at a university in northern Sweden was carried out. This twelve-year longitudinal study (2004 – 2016) encompasses data from an online Bachelor of Science in Pharmacy programme (BSc Pharm). During the twelve-year period the programme has undergone organisational and structural changes, for example, from 2010 onwards a Master in Pharmacy (MPharm) programme was added and from 2011 a Master of Science in Pharmacy (MSc Pharm) programme. The BSc Pharm programme was originally developed in 2003 in response to the need for qualified pharmacists in rural, sparsely populated areas (Nordström & Englund, 2004). Around 25 teachers are currently involved in the delivery of the programmes although many of the individuals have changed over the twelve-year period. The programme was designed and implemented as an online programme and does not have a campus-based equivalent at the university.

The research studies that constitute this thesis build on a substantial body of research on teaching and learning, (further elaborated in Chapter 2), including the theoretical framework provided by studies of conceptions of teaching and learning and approaches to teaching (CAT), (Marton, 1994a; Trigwell & Prosser, 1996a; Trigwell, Prosser, & Taylor, 1994). In paper I, changes in teachers' conceptions of and approaches to teaching with Edtech were traced over ten years to try to understand factors that might impact on academic change and development as experienced by the individual teachers on the online pharmacy programme (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Ertmer, Ottenbreit-Leftwich, & Tondeur, 2014). In paper II the influence of the teachers' conceptions of teaching and learning on their choice and use of Edtech was explored, specifically investigating the implementation of three-dimensional virtual worlds (3DVW) in the pharmacy programme and in a nursing programme (Kirkwood & Price, 2012; Savin-Baden et al., 2010). In paper III the theoretical framework provided by CAT was combined with that of Cultural-Historical Activity Theory (CHAT) (Engeström, 1987, 2001) described in Chapter 3, to investigate the influence of sociocultural and structural contextual factors in relation to change and development in conceptions and approaches to teaching with Edtech. In the two final papers an interventionist method, the Change Laboratory (see Chapter 3), was employed to instigate collaborative development processes at the meso-level of the programme teaching team. Paper IV investigated in what way the Change Laboratory activity facilitated the participants' collaborative analysis and development of curriculum coherence on the online pharmacy programme while paper V investigated whether a Change Laboratory intervention can promote agency in participants and act as a sustainable method of academic development in HE.

Aim and research questions

The principal aim of the research carried out for this thesis was to gain a deeper understanding of factors that influence academic change and development in a higher education teaching and learning environment supported by Edtech. An additional aim was to provide insight into factors that may be relevant in the design of academic development activities to support teachers and managers in the enhancement of teaching and learning. The research thus sought to explore change and development adopting a multi-level approach: exploring conceptions and approaches to teaching with Edtech at the micro-level of the teacher, exploring sociocultural factors at the meso-level of the department or programme and exploring structural factors that may have influenced these changes at the macro-level of the institution.

Teaching and learning in HE is highly complex and if a deeper understanding is to be achieved a holistic approach is advised, taking into consideration factors at micro-, meso- and macro-level and the interrelationships between these factors. The research approach has been to adopt a grounded theory philosophy, moving from practice to theory. Individual theories have informed and shaped an understanding of academic practice in higher education and how this can be supported on micro, meso and macro-levels, helping to formulate a scholarly understanding of the whole.

This thesis builds on the earlier work of a range of researchers, but also endeavours to contribute to an understanding of academic change and development that may inform academic development activities. In the thesis the following research questions are addressed:

- *How can individual higher education teachers be supported to facilitate academic change and development?*
- *What sociocultural and structural contextual factors support or hinder change and development in higher education academic practice?*
- *How can higher education teachers be supported to collaboratively change and develop academic practice as a group?*
- *How can academic change and development in higher education be understood from a scholarly perspective?*

Structure of the thesis

Following this introduction, Chapter 2 will examine the three intersecting areas of research on which the thesis build: educational technology, higher education and academic development. Chapter 3 describes the two theoretical frameworks chosen to analyse empirical data: Conceptions of and Approaches to Teaching

(CAT) and Cultural-Historical Activity Theory (CHAT). The framework provided by CAT was used to explore and analyse the individual experiences of the teachers in papers I and II, in particular the relations between the teachers' conceptions of teaching and learning and use of Edtech and how these might change and develop over time were examined. The second theoretical framework, CHAT, was applied in paper III to expand the analysis and to include an exploration of how teaching practice at the micro-level of the individual is related to the collective meso-level of department or programme and to macro-level institutional structures. Finally, the chapter contains a description of the Change Laboratory method, applied in papers IV and V to investigate collaborative change and development. The research design and methodology are then outlined in Chapter 4, including methods of data collection and analysis, ethical considerations and a discussion of my role as researcher within the context of the online pharmacy programme. Chapter 5 contains a summary of the five papers included in the thesis. The findings from the five papers are discussed in relation to the overall aim of the thesis and research questions in Chapter 6. Finally, conclusions and suggestions for future research are presented.

2. Overview of research literature and key themes

The changing higher education landscape

The period covered by this thesis (2004-2016) sits within a longer timeframe of change in European higher education. Institutions have expanded and diversified at an unprecedented rate over the last two decades in response to the rapidly changing higher education (HE) climate (Allais, 2014; Henkel, 2016; Saroyan & Trigwell, 2015). The external pressures on institutions derive from a variety of sources: a larger and more diverse student population, increasing use of educational technologies (Edtech), flexible methods of delivery, the marketization of higher education and increasing demands for accountability (D'Andrea & Gosling, 2007; Deem, 2001; Hornsby & Osman, 2014; J. Knight, 2013). Altbach and Knight (2007) suggest that internationalisation has also provided a major impetus for change in HE. In particular the introduction of the Bologna Process (1999), creating a common European HE area with standardised teaching and learning outcomes, has contributed to the restructuring and development of many HE programmes. These have frequently required new approaches to teaching and the re-negotiation of local teaching practices (Handal et al., 2014; Quinlan & Berndtson, 2012). There has also been pressure on HE institutions internationally to offer interdisciplinary education programmes that provide a high degree of employability (Brint, Turk-Bicakci, Proctor, & Murphy, 2009; Jacob, 2015; Millar, 2016). However, research on interdisciplinary programmes indicates that they frequently result in increasingly complex academic and organisational structures, requiring collaboration across disciplinary boundaries that challenge current practices and pedagogies (D. B. Knight, Lattuca, Kimball, & Reason, 2013).

If HE is to respond to these changes the development and adaptation of teaching and learning practices by both teachers and institutions is necessary. However, despite the profound changes in the HE landscape over the past two decades, the manner in which academic development is provided has to a great extent remained static (Geertsema & Chng, 2017). Many academic development activities continue to focus on the development of the individual teacher as an isolated and independent element in the teaching and learning process (Stes, Min-Leliveld, Gijbels, & Van Petegem, 2010). Nonetheless, research in the field of academic development increasingly indicates the significance of factors such as the role of mid-level leadership (Katarina Mårtensson & Torgny Roxå, 2016), local teaching cultures (Trowler et al., 2012) and institutional policy and strategy (Fanghanel, 2007). The provision of relevant and effective academic development therefore requires an understanding of factors that influence practice on multiple

levels; at micro-, meso- and macro-level (D'Andrea & Gosling, 2007; Kirkwood & Price, 2006).

The overall intention of this thesis is to explore factors that impact on academic change and development in a HE teaching and learning environment supported by educational technology. An additional aim is to provide insight into factors that may be relevant in the design of academic development activities. The thesis is located within the fields of *Higher Education* (HE), *Educational Technology* (Edtech)) and *Academic Development* (AD). As illustrated in Figure 1, they are not separate entities but constitute overlapping fields within the discipline of education. The following sections describe current research within these fields that frames and contextualises this thesis.

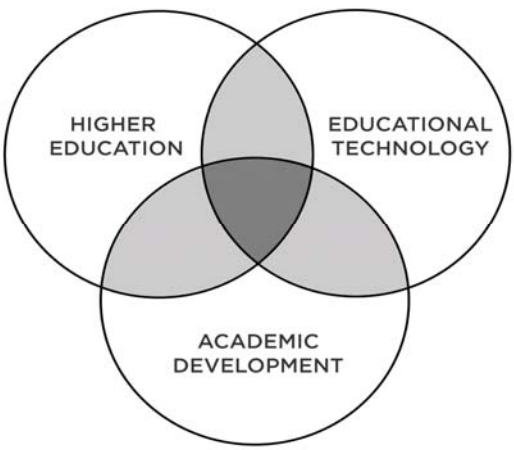

Figure 1. The intersecting research fields of the thesis

Higher Education as a research field

Internationally, research into HE became established in the 1960s and 1970s in parallel with the rapid expansion of tertiary education and concerns about the quality of its provision (Amaral & Magalhães, 2013; Teichler, 2005). Studies in HE have been carried out by researchers from a range of disciplinary backgrounds including sociology, psychology, philosophy and management. Thus it is possible to frame practices and knowledge within HE from a range of perspectives depending on the theoretical and analytical framework applied (Tight, 2012). In an examination of the analytical frameworks commonly used in HE studies, Clegg (2012) found that researchers drew on a variety of concepts and theories including: communities of practice (Wenger, 2000; Wenger & Lave, 1991), academic tribes and territories (Becher, 2001), Bernstein's notions of code

theory and regulation (Bernstein, 2000) and Bourdieu's usage of habitus and social and cultural capital (Bourdieu, 1988; Bourdieu & Wacquant, 1992). This variation in HE research perspectives is frequently advantageous where an interdisciplinary approach is needed. However, it can also lead to a lack of cohesion in the field when the same object of study is investigated from different disciplinary locations or with different underlying purposes (Hancock, Clegg, Crossouard, Kahn, & Weller, 2016; Tight, 2012). As in the present thesis, much HE research stems from practice and pragmatic concerns that originate in a desire to elucidate the dynamics of academic change and development (Altbach, 2014).

Research into HE is most often regarded as multiple related fields, however two main clusters have been identified (Clegg, 2012; Macfarlane, 2012; Tight, 2008, 2012):

- Teaching and learning, including course design and the student experience.
- Policy, including quality, system policy, institutional management and academic work.

The studies that constitute this thesis are situated mainly within the theme of 'teaching and learning' but also include institutional factors such as policy and strategy, providing a holistic view of change and development at micro-, meso- and macro-levels. Within the 'teaching and learning' research cluster, an increasing number of studies have been carried out that focus on examining teachers' approaches to teaching and their conceptions of teaching (Martin, Prosser, Trigwell, Ramsden, & Benjamin, 2002; Trigwell & Prosser, 1996b; Trigwell et al., 1994). Research on approaches to teaching has emphasised the importance of teachers' conceptions of teaching and has been influential in considering the relationship between teaching and student learning. As this area of research is of importance in the thesis it will be described in more detail.

Conceptions of Teaching and Learning and Approaches to Teaching (CAT)

Two different research approaches can be identified in the research into CAT. Firstly, a phenomenographic approach in which qualitatively different experiences and understandings of teaching and learning are identified (Booth, 1997; Dall'Alba, 1991; Martin et al., 2002; Marton, 1994a; Prosser et al., 1994; G. Åkerlind, 2003, 2008). Secondly, research approaches focusing on the beliefs dimensions of teachers' conceptions of teaching and learning (Entwistle, Skinner, Entwistle, & Orr, 2010; Ertmer, 2005; Glassett & Schrum, 2009; Samuelowicz & Bain, 1992, 2001).

Research into university teachers' approaches to teaching has consistently shown evidence of variation in the ways teachers approach their teaching (Jacobs et al., 2014; Prosser & Trigwell, 1999a) and the association between teachers' approaches to teaching and their conceptions of teaching (Lam & Kember, 2006; Norton, Richardson, Hartley, Newstead, & Mayes, 2005; Trigwell & Prosser, 1996a). The majority of researchers distinguish between two main approaches to teaching: a teacher- or content-focused and a student- or conceptual change-focused (González, 2011; Lindblom-Ylänne, Trigwell, Nevgi, & Ashwin, 2006; Prosser et al., 1994; Samuelowicz & Bain, 1992, 2001). However there are differences in the literature regarding definitions and labels used to describe conceptions and approaches (Pajares, 1992). For example, the concepts teacher-focused and student-focused are used by Prosser, Trigwell and Taylor (1994), while Kember and Kwan (2000) applied the concepts content-centred and learning-centred. Postareff and Lindblom-Ylänne (2008) use the concepts learning-focused and content-focused and suggest that what differentiates these two approaches is the purpose of teaching. For some teachers, the purpose lies in improving student learning, while for other teachers', the primary focus is on the course content. The concept of a 'teaching approach' is seen by some researchers as relatively stable (Kember & Kwan, 2000) while others see it as dynamic (Cheng, Tang, & Cheng, 2015; Song & Looi, 2011; Trigwell & Prosser, 1996a) and context dependent (Chen, 2015; Fanghanel & Trowler, 2008; Lindblom-Ylänne et al., 2006). A student-centred approach is consistently viewed as more sophisticated and desirable than a teacher-centred approach (Kember & Gow, 1994; Wright, 2011). Hence is it important to understand what situations and activities offer the best opportunities for teachers to develop such approaches.

The methodological framework adopted in this thesis to investigate approaches to teaching and conceptual change and development, builds on Prosser and Trigwell's (1999b; 1999) relational model. Prosser and Trigwell (1999) contend that university teachers approach their teaching in qualitatively different ways, and that underlying these approaches are qualitatively different conceptions of teaching and learning. Further, the way in which a teacher approaches teaching is commensurate with their students' approaches to learning. When teachers adopt student-focused approaches to teaching they aim to promote conceptual change. Correspondingly, their students are more likely to adopt deeper approaches to learning. On the contrary, teachers with a teacher-focused approach to teaching focus on the transmission of information, and subsequently their students are more likely to adopt a surface approach to learning (see also Ho, Watkins, & Kelly, 2001; Prosser, Ramsden, Trigwell, & Martin, 2003; Trigwell et al., 1999).

One significance of these differing approaches to teaching lies in the manner in which they influence how technology is used to facilitate learning (Hammond, 2011; Kirkwood & Price, 2012; Teo & Zhou, 2016). Content-focused teaching is likely to manifest itself in technology use for the presentation of information such as pre-recorded lectures, or the use of a virtual learning environment (VLE) to post course information (Kirkwood & Price, 2014). In comparison, a learning-focused use of technology allows students to demonstrate their understanding of a topic through, for example, discussion or collaborative production of online materials (Kirkwood & Price, 2013). As was illustrated in paper II, in particular, the use of virtual worlds requires a more student-centred approach to teaching if the possibilities offered by communicative, authentic digital technologies are to be realised (De Freitas & Veletsianos, 2010; Savin-Baden, 2010b). It is important for teachers to perceive and use technology as an integral part of a student-centred approach to teaching if enhanced learning outcomes are to be achieved (Glassett & Schrum, 2009; Kim, Kim, Lee, Spector, & DeMeester, 2013; Kreber & Kanuka, 2013). How teachers conceptualise Edtech and its role in teaching has been shown to have significant impact on how they utilise technology in their teaching practice (Cope & Ward, 2002; Kirkwood & Price, 2012; Price & Kirkwood, 2014).

In the exploration of factors that influence academic change and development, it is necessary to consider not only the micro-level of the individual but also contextual sociocultural factors at meso-level and macro-level structural factors. Although conceptions of teaching in HE is well researched, research into departmental and institutional contexts and their effect upon academic change and development is not as common (Roxå & Mårtensson, 2012; Saroyan & Trigwell, 2015). Fanghanel (2007) while others (Leibowitz et al., 2014; Van Schalkwyk, Leibowitz, Herman, & Farmer, 2015) argue that the role played by both the sociocultural and the structural context in which academics work also has a considerable influence upon how they conceive and approach teaching and learning.

The sociocultural context: disciplinary differences and academic cultures

There is a significant body of literature focusing on disciplinary differences and on academic cultures at meso-level (Becher, 2001; Fanghanel & Trowler, 2008; Leibowitz, 2015; Trowler et al., 2012). Epistemological differences between the disciplines are frequently reflected in academic culture; as a result of different conceptions of teaching and learning, disciplinary contrasts in the norms and practices of teaching are visible (Becher, 1989; J. J. Lee, 2007; Neumann et al., 2010). Conceptions of teaching and learning in turn affect the choice and use of Edtech; teacher-centred approaches and the use of recorded lectures, tests and quizzes are prevalent in 'hard' disciplines such as physics and chemistry, while a

more student-centred approach and the use of online discussions and social media is more common in 'soft' disciplines such as history and education (Henkel, 2000; Lindblom-Ylänne et al., 2006; Lueddeke, 2003).

Teachers' practices are not only influenced by the epistemological structure of the discipline but also by individual departmental cultures and conventions (Trowler, 2009, 2014). For example, the extent to which a department is perceived to value good teaching is linked with academics' approaches to teaching (Prosser & Trigwell, 1999a). University teachers are simultaneously members of several communities of practice, such as a research or programme team, however the academic department is usually the most important in HE (Trowler & Knight, 2000). The academic culture of a particular community is continually constructed and maintained as members act and interact, changing and being changed by the community (Ancona, Kochan, Scully, Van Maanen, & Westney, 2004; Lave & Wenger, 1991; Wenger, 2000). Communication and dialogue, where meaning is negotiated, are important components of cultural construction and the development and maintenance of communities (Katarina Mårtensson & Torgny Roxå, 2016).

Institutional context: strategy and policy

The formal structures at macro-level within which the teachers must operate constitute the institutional context and can include, for example, institutional policies, regulations, the requirements of external validating bodies and the external political environment (Hannah & Lester, 2009). These structures determine the overarching context and can constrain or enable the choices and opportunities for change and development available to individuals and communities working within the organisation (Mathieson, 2011; Selwyn, 2007).

Institutional policies, particularly policies regarding promotions, rewards and technology use, also influence the sociocultural context, including the norms and ideologies operating at institutional and departmental level (Leibowitz et al., 2014; Price & Kirkwood, 2014). For example, in a research focused institution, promotion criteria may focus solely on evidence of research output which downplays teaching-related activities (Cruz, 2014; Fitzpatrick & Moore, 2013). Policies indicate what is valued by the institution and as such influence discourse and set the tone for teaching, research and technology use (Cretchley et al., 2013; Quinn, 2012). As noted by Somekh (2008), "Teachers are not 'free agents' and their use of Edtech for teaching and learning depends on the interlocking cultural, social and organizational contexts in which they live and work" (p. 450).

Although the institution sets the structural context for academic work establishing the rules, providing resources and setting the task, institutional policies are interpreted by the departments (J. J. Lee, 2007; Price et al., 2016). It

is the local community that develops the day-to-day practices, both in terms of what is enacted and how it is described and discussed (Trowler & Knight, 2000). If the main focus of the institution is research, as mediated by policy and strategy documents, this is frequently reflected in departmental culture, permeating the explicit and implicit rules governing the community (Leibowitz, van Schalkwyk, Ruiters, Farmer, & Adendorff, 2012; Trowler et al., 2012). Where teachers do not perceive teaching and learning to be prioritised by management or the local teaching community, their possibilities for academic change and development may be restricted (Schulz, 2013). Further, in a study of the impact of an academic development course in a UK research-intensive university, Skelton (2013) found that the course did not always have a positive impact on participants in terms of how they were viewed by departmental colleagues. Hence, it is important to understand how the departmental context interprets, enacts and influences academic practices in relation to teaching and learning.

As can be seen, there are a number of factors that may influence academic change and development in a technology-rich HE environment. These factors operate at micro-, meso- and macro-levels and include individual teachers' conceptions of and approaches to teaching and learning, sociocultural contextual factors such as departmental teaching cultures and structural factors, such as institutional policy and strategy. Taking previous research into consideration, it becomes apparent that academic development activities to support teachers and managers in the change and development of teaching and learning in HE are required at multiple levels.

Educational technology as a research field

An often-voiced opinion, with regard to the changing landscape of HE, is the ability of Edtech to provide a solution to many of the problems encountered, such as large student groups and the need for increased flexibility. Academic practice is increasingly influenced by policies revolving around technological trends such as 'e-learning', massive open online courses (MOOCs) and virtual reality (De Freitas & Martin, 2005; Liyanagunawardena, Adams, & Williams, 2013; Russell, 2009; Salajan & Roumell, 2016). However, a disparity between rhetoric and reality is apparent in much of the literature concerning the influence of Edtech on academic practice. As Laurillard (2008) wryly observes, "education is on the brink of being transformed through learning technologies; however, it has been on that brink for some decades now" (p. 1). Although there are many references to the 'transformative' potential of Edtech (Conole, 2014; Henderson, Selwyn, & Aston, 2015; Laurillard, 2008; Torrisi-Steele & Drew, 2013), there is little evidence of the long-promised revolution (Conole, de Laat, Dillon, & Darby, 2008; Kirkwood & Price, 2013a; Olofsson & Lindberg, 2014; Price & Kirkwood, 2014; Selwyn, 2010). As expressed by Selwyn, (2007) there is a growing need for

educational research to account for the distinct 'digital disconnect' between the enthusiastic rhetoric and rather uninspiring reality of university educational technology use.

The research field of Edtech is comparatively diverse being informed by theories and concepts from many other disciplines, including education, computer science, psychology, cognitive science, and communication. As pointed out by Selwyn (2014) "it is important to note that 'educational technology' is not a single, homogenous entity. Instead 'educational technology' is a deceptively neat shorthand for a diverse array of socio-technical devices, activities and practices" (p. 6). The diversity of ontological and epistemological perspectives in Edtech research is evidenced in the application of a wide variety of methods, theories and assessments, frequently used to examine the same phenomena (Spector, Johnson, & Young, 2014). As a consequence of changes in society, educational practices and evolving technologies the Edtech research field has expanded and shifted in focus over the last three decades (Cox, 2013; Hsu, Hung, & Ching, 2013; Olofsson & Lindberg, 2014). The changing focus reflects an evolution from micro-level, individual questions to meso-level collaborative learning, and from practical issues of implementation to questions of strategy and policy concerning the pedagogical integration of Edtech at the macro-level of the institution (Lowyck, 2014; Spector et al., 2014).

Although there has been an exponential growth of research published in peer-reviewed journals in the field of Edtech, scholars like Kinchin (2012) and Lowyck (2014) argue that there seems to be little theoretical or practical cross-fertilisation between research on Edtech and research on teaching and learning. This apparent lack of dialogue between educational technologists and academic developers (Hudson, 2009) coupled with the adoption of a 'technopositivist' ideology (Njenga & Fourie, 2010; Selwyn, 2011) by management, tend to separate Edtech from teaching and learning. Mostert and Quinn (2009) suggest that this frequently results in the separation of institutional policy documents in HE where 'teaching and learning strategies' are published as separate documents from 'e-learning strategies'. This separation of modes of teaching and learning by the institution influences discourse and sets the tone for teaching and research (Cretchley et al., 2013; Quinn, 2012). It acts to constrain or to enable the choices and opportunities available to individual teachers and their communities within the organisation (Kaatrakoski, Littlejohn, & Hood, 2016; Mathieson, 2011).

One factor, however, identified in both the literature concerning teaching and learning and that of the integration of Edtech, is the central importance of teachers' conception of and approaches to teaching and learning with technology (Kim et al., 2013; Kirkwood, 2009; Kirkwood & Price, 2006; Somekh, 2008). There is a growing body of research that suggests that the effective utilisation of Edtech by academics requires a shift in both skills and conceptions of learning

and teaching (Price & Kirkwood, 2014). In addition to acquiring skills in the use of technologies, a move from a teaching-focused approach that emphasises the transmission of knowledge, to a learner-focused approach in which students become the discoverers and constructors of knowledge is indicated (Ertmer & Ottenbreit-Leftwich, 2010; Ho et al., 2001). The implementation of Edtech in teaching practice is a complex process with many aspects to consider (Laurillard & Deepwell, 2014). A large body of studies have examined factors influencing the successful implementation of Edtech in HE at the micro-level of the teacher (Mumtaz, 2000). These include, for example, extrinsic factors such as technical infrastructure and degree of support, and intrinsic factors, such as attitudes to and conceptions of technology use (Drent & Meelissen, 2008; Errington, 2004; Price & Kirkwood, 2014; Somekh, 2008). The motivation of teachers and their competence to know why, when and how best to implement educational technologies has also been identified as crucial to the integration of Edtech (Krumsvik, 2014; Laurillard & Masterman, 2009; Lindberg & Olofsson, 2012; Schneckenberg, 2009, 2010). Academic development activities that support conceptual change and the pedagogical adoption of Edtech are therefore essential in the development and adaptation of teaching and learning practices in HE.

A question not frequently discussed in the research literature is the rapidly changing array of available Edtech and the increasing ubiquity of Edtech in HE. The integration of Edtech in teaching and learning is no longer a choice for the majority of teachers in HE today; rather the provision of digital literacy for students is essential (M. C. Murray & Pérez, 2014). At the inception of this thesis in 2004, the Edtech available to teachers was limited in comparison with the present situation. Both Edtech and research on Edtech has also changed and developed from transmissive technologies such as VLEs, and pre-recorded lectures in 2004 to collaborative, interactive technologies such as virtual worlds, community driven websites and student co-production of materials. These developments can facilitate a more student-focused, interactive mode of teaching and research has shown that Edtech can act as a positive factor, leading to changes in teachers' conceptions of teaching with technology (Ertmer et al., 2014). Nonetheless, despite the availability and increasing ease of use of Edtech it does not automatically lead to the adoption of student-focused practices by teachers (Kirkwood & Price, 2014; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). Edtech in itself is not innovative; as argued by Kirkwood (2014) "technological determinism endorses the notion that using technology for teaching will in and of itself lead to enhanced or transformed educational practices" (p. 215).

Academic development as a research field

Academic development emerged as a distinctive field within education research in the late 1960s and 1970s (Clegg, 2009a). Its emergence can be linked with several prevailing forces of change in HE such as the 'massification' of university education, student demands for quality improvements in teaching and the introduction of mass distance education with the establishment of the Open University in the UK (Domar, 1999; A. Lee, Manathunga, & Kandlbinder, 2010; Manathunga, 2011; Åkesson & Falk-Nilsson, 2010). Although the term 'academic development' can have different meanings internationally (Clegg, 2009b) it is used here as synonymous with 'educational' or 'faculty' development. In line with the definition suggested by Mårtensson (2014), academic development is understood in this thesis to include various activities aimed at the development of teaching at the micro-level of the individual, leadership of teaching at the departmental meso-level and strategy and policy development at the macro-level of the institution, ultimately resulting in the enhancement of the student learning experience.

Similar to Edtech, academic development research is informed by theories and concepts from many disciplines including education, sociology, psychology, organisational and change management and applied linguistics (Leibowitz, 2014). With reference to its multiple orientations and theoretical fragmentation, academic development as a field has been the subject of critical dialogue, indeed Harland and Staniforth (2008) describe it as 'a family of strangers' (p. 669). Nonetheless, as emphasised by Clegg (2009a), academic development as a site of practice in HE has been influential in shaping discourse and instrumental in the emergence of the 'subject' of 'teaching and learning in higher education' (p. 403).

Changes in society and education necessitate the development and adaptation of teaching and learning practices in HE (Kirkwood & Price, 2006) and academic development activities are required at multiple levels to support this. Although many HE institutions have responded by implementing a wide range of academic development activities aimed at improving teaching and learning quality, the majority of these initiatives have focused on the development of the individual teacher (Chalmers & Gardiner, 2015; Gibbs, 2013). However, research indicates that the departmental context is the key organisational unit with regard to teaching and learning cultures and that this in turn influences teaching practice (Healey, Bradford, Roberts, & Knight, 2013; P. Knight & Trowler, 2000). The culture and context of practice of the department also influences the long-term impact of academic development programmes (Leibowitz, 2015; Stes, Clement, & Van Petegem, 2007), where a lack of consensus and collaboration between colleagues is perceived as a constraint (P. Knight & Trowler, 2000). This reflects earlier research that emphasises that the impact of academic development

depends strongly on the teachers' working context and supportive networks (Clarke & Hollingsworth, 2002; Smith, 2012). The predominant teaching culture of the community to which teachers belong (Trowler & Cooper, 2002; Trowler & Wareham, 2008), as well as the leadership within the department are also highly influential. A deeper understanding of sociocultural processes at the meso-level of the department therefore has practical implications for academic development strategies.

A potential problem with many current academic development initiatives is that they are instigated by management as a solution to a perceived problem or in response to performance targets, implying a deficit model of academic development (Ball, 2012; J. Murray, 2012). This approach does not, however, promote the agency and engagement of participants in cooperative development activities (Garet, Porter, Desimone, Birman, & Yoon, 2001; Voogt et al., 2015). It frequently results in lack of engagement or rejection of the initiative by teachers (März & Kelchtermans, 2013; Vähäsantanen, 2015). In order to envision and implement sustainable academic development, teachers need to play an agentic role, developing the ability to question, analyse and shape their own practice (Haapasaari, Engeström, & Kerosuo, 2016; Sannino, Engeström, & Lemos, 2016). Understanding how agency emerges and how it can be supported is essential for sustainable academic development (Sannino, 2015a).

An intervention method designed to facilitate change and development among groups of practitioners developed by Engeström (2007; 1996) is the Change Laboratory. In contrast to the majority of academic development activities, it involves the researcher or academic developer working together with the participants to analyse existing practice and to collaboratively construct and implement new practice (Engeström & Sannino, 2010). Thus the starting point for the examination of the specific problem comes from the participants themselves rather than external parties, such as management or academic developers. Participants are able to develop their understanding of how current discourses and practices have been shaped culturally and historically so that they can be developed collaboratively (Engeström, 2001).

The Change Laboratory has been implemented and researched in a variety of settings ranging from hospitals (Kerosuo, Kajamaa, & Engeström, 2010), libraries (Engeström, Rantavuori, & Kerosuo, 2013) and schools (Engeström, Engeström, & Suntio, 2008) to factories (Virkkunen & Ahonen, 2011) and post offices (Engeström et al., 1996). There is as yet little research on Change Laboratory interventions in a HE context, although cultural-historical activity theory (CHAT) is increasingly being applied as an analytical tool. For example, CHAT has been

used to explore the place of research in the work of teacher educators (Berg, Gunn, Hill, & Haigh, 2016) and the implementation of Edtech (Pettersson, 2015; Yamagata-Lynch, Cowan, & Luetkehans, 2015).

It has been argued that an important component of academic change and development is the investigation of practice by practitioners themselves, promoting a scholarly approach to academic development that has the potential to improve student learning (Ashwin & Trigwell, 2004; Fanghanel, 2012; Huber & Hutchings, 2006). The concept of the Scholarship of Teaching and Learning (SoTL) was first introduced by Ernst Boyer in 1990 in an effort to raise the status of teaching in relation to research. As conceptualised by Boyer (1990), SoTL engages teachers in a systematic and reflective approach to their teaching. Ashwin and Trigwell (2004) identify three qualitatively different levels of practice on which scholarship can take place, each with its own aim: personal knowledge, local knowledge and public knowledge. The difference between the three types of knowledge generated lies in the different standards of evidence required. At micro-level teachers frequently investigate practice for their own ends in an ongoing process, validating results with respect to their own experience. At meso-level, personal knowledge is expanded to local knowledge within the department or programme. This could take place, for example, through collaborative, project-based investigations or through seminars and discussions. By sharing scholarly work and receiving feedback from colleagues, evidence and conclusions are examined and validated. At the macro-level of investigation teachers may submit their work to a wider audience for peer-review and verification, for example, by submitting research to a refereed journal or conference, thereby creating public knowledge. Nonetheless, investigation that develops public knowledge is only one form of inquiry and does not constitute a necessary condition for SoTL (Ashwin & Trigwell, 2004).

Over the last two decades SoTL has developed and diversified and today embodies a range of aims, activities and contexts (Booth & Woollacott, 2017; Trigwell, 2013). A number of issues and concerns regarding its constitution and definition have been raised, questioning for example its position with regard to educational research, definitions of excellence in teaching and its transformational ability (Fanghanel et al., 2016; Geertsema, 2016; Kreber, 2013). There is nonetheless a general consensus that the key features of SoTL include a concern to improve student learning through a scholarly approach to teaching (Booth & Woollacott, 2015). Fanghanel (2013) suggests that "it is better to reflect on what SoTL can do rather than on what SoTL can mean" (p. 60) and proposes that SoTL has an important role to play as a tool for academic development in HE.

Summary

An examination of the research concerning academic change and development in a technology rich HE environment provides an illustration of the complexity of the field. It also indicates areas where further research is required. In particular, there is little research on the interrelationship between the different factors involved at micro-level, such as conceptions and approaches to teaching, at meso-level with regard to sociocultural factors and at macro-level, concerning structural factors such as institutional policy and strategy. Further, consideration of all three levels of analysis is uncommon in research literature across the research fields of HE, Edtech and academic development and an overall lack of synthesis and collaboration within and between research in the three fields is evident.

Teaching and learning in HE is highly complex and if a deeper understanding is to be achieved, it is necessary to adopt a holistic approach. This entails an examination of individual differences in teachers' conceptions of teaching, the sociocultural context of the departmental or programme within which they work, the strategies and policies of the institution and the interrelationships between these factors (Price et al., 2016). This thesis aims to address these gaps by exploring the factors and their interrelationships that influence the change and development of teachers on an online pharmacy programme at micro-, meso- and macro-level.

3. Theoretical frameworks

The two theoretical frameworks applied in the thesis are presented in this chapter. The aims presented in the introduction and studies in this thesis developed over time from 2004 to 2016. In alignment with a pragmatic, practice-driven approach (Denscombe, 2008), the research design and theoretical foundations of the thesis gradually evolved as the studies provided new insights and raised new questions. As shown in Table 1, the research questions examined academic change and development in a higher education (HE) teaching and learning environment supported by educational technology (Edtech) from different perspectives. This multiplicity of viewpoints allowed a holistic examination of academic change and development with the intention of understanding the factors that promote or act as barriers to its development. During the research process the focus expanded from an investigation of the micro-level context of the individual teacher's practice, to include the meso-level sociocultural context and macro-level structural context within which teachers work.

Ashwin (2012, p. 953) urges the use of different theories or 'ways of seeing' to conceptualise research and analyse data. There are limitations to using a single theoretical lens, where the use of one theoretical perspective invites the use of a particular set of concepts and methods that can result in the identification of anticipated findings (Kahn, 2015; Trowler, 2012). To explore and understand the complexity of teaching in HE with Edtech, this thesis uses two theoretical frameworks: conceptions of and approaches to teaching (CAT), and Cultural-Historical Activity Theory (CHAT). This multiple-theory approach is adopted in order to illuminate different aspects of academic practice and to provide a rich understanding of the factors underlying academic change and development.

This chapter begins with a discussion of the two theoretical frameworks used and the reasoning behind their application. This is followed by an introduction to the theoretical framework of CAT used in papers I and II, that examine factors influencing the teaching practice of individual teachers. The theoretical framework of CHAT used in papers III, IV and V is then introduced followed by a short summary and discussion of the relative possibilities and challenges of the two frameworks.

Theoretical considerations

At the outset of the research process, the initial focus was to investigate the variation in Edtech implementation by the individual teachers working on the online pharmacy programme. Earlier research indicates that there are many

factors both extrinsic, such as technical infrastructure and degree of support, and intrinsic, such as attitudes to and conceptions of technology use, that determine how teachers in HE employ Edtech (Drent & Meelissen, 2008; Errington, 2004; Price, 2014; Somekh, 2008). In the case of the online pharmacy programme, although many extrinsic factors are likely to have changed over the course of the thesis these changes have been the same for all the teachers. The theoretical framework offered by CAT (Marton, Hounsell, & Entwistle, 1997; Prosser & Trigwell, 1999b; Prosser et al., 1994) is well-established in research literature and has been proven as a reliable instrument in the investigation of teacher conceptions and approaches (Ho et al., 2001; Kirkwood & Price, 2012; Lam & Kember, 2006; Nevgi, Postareff, & Lindblom-Ylänne, 2004; Postareff & Lindblom-Ylänne, 2008). CAT was therefore judged to be a suitable framework in the exploration of intrinsic factors, providing a method of analysis of conceptual change over time.

The purpose of CAT is to understand the relations between teachers' perceptions of the teaching environment, their conceptions of and approaches to teaching and learning and outcomes in the form of students' learning (see the following section for a more detailed explanation). As such, the use of CAT provides conceptual and methodological tools that support the analysis of these relations. For example, in paper I the five categories of approaches to teaching developed by Trigwell, Prosser and Taylor (1994) were used as a framework for the categorisation and analysis of the teachers' approaches to teaching and to identify changes in these over time. The framework was also extrapolated to include approaches to teaching with Edtech and was applied in both paper I and paper II to investigate the relationship between underlying approaches to teaching and approaches to teaching with Edtech.

In paper I, teachers displayed changes in their approaches to teaching with Edtech to different degrees. Furthermore, the observed changes were not evenly distributed among teachers from different departments and disciplines. These results seemed to indicate that there might be additional factors that play an important role in changes in approaches to teaching with Edtech. Following on from indications provided by papers I and II, further research questions were formulated concerning the impact of sociocultural contextual factors such as the teaching cultures of the respondents' departments and structural contextual factors such as institutional policy and strategy on teaching practice. Although the theoretical framework of CAT was functional in the analysis of the experiences of the individual teacher, it does not allow an exploration of sociocultural and

structural contextual factors and the interplay between them. A second theoretical framework was therefore applied to enable an examination of how teaching practice at the micro-level of the individual is related to the collective meso-level of department or programme and to macro-level institutional structures.

Table 1. Theoretical frameworks used for analysis of empirical data.

Purpose	**Question**	**Level of analysis**	**Theoretical framework**
Paper I: To explore how teachers' conceptions of and approaches to teaching and learning with technology change and develop over time.	How can individual higher education teachers be supported to facilitate academic change and development?	Micro-level: individual teacher	CAT
Paper II: To explore how teachers' approaches to teaching with Edtech and conceptions of teaching and learning with technology influence the implementation of three-dimensional virtual worlds.	How can individual higher education teachers be supported to facilitate academic change and development?	Micro-level: individual teacher	CAT
Paper III: To explore how sociocultural and structural contextual factors impact on the way university teachers conceptualise and approach teaching and learning.	What sociocultural and structural contextual factors support or hinder change and development in higher education academic practice?	Micro-level: individual teacher Meso-level: disciplinary context/ community of practice Macro-level: institutional context.	CAT CHAT
Paper IV: To explore how the Change Laboratory intervention can facilitate the participants' collaborative analysis and development of the interdisciplinary online pharmacy programme.	How can higher education teachers be supported to collaboratively change and develop academic practice as a group?	Meso-level: programme team/teaching team (team-based development)	CHAT
Paper V: To explore how the Change Laboratory intervention supported participants to become agents of their own development process and if this agency was sustained after the intervention.	How can higher education teachers be supported to collaboratively change and develop academic practice as a group?	Meso-level: team-based development of agency Micro-level: individual agency	CHAT

The purpose of Cultural-Historical Activity Theory (CHAT) in this thesis is to analyse the teachers' interactions and relationships within the wider sociocultural context in which they occur (Engeström, 1987; Kuutti, 1996). CHAT provides a theoretical and methodological framework for the analysis of educational activity in practice that can be used to highlight problematic features of the teaching and learning setting. CHAT presents a holistic perspective on human activity, providing a means of studying human actions and interactions with artefacts within a historical, cultural and environmental context. As such it is well suited for use as a conceptual lens in the investigation of factors impacting on academic change and development in HE (V. Ellis, Edwards, & Smagorinsky, 2010; Roth & Lee, 2007).

In paper III, when examining the sociocultural and structural contextual factors that influence the development of conceptions and approach to teaching, both CHAT and CAT were used in the analysis of data. Engeström's model of an activity system (1987) (further explained in the following section) was used to analyse teaching practice as an activity system, revealing the impact of the departmental teaching community and institutional policy on the conceptual development of the individual teachers. Evolving from paper III, new questions arose concerning group processes in the development of teaching practice and the development of agency by teachers. To explore collaborative development at the meso-level of the programme teaching-team, an interventionist method based on CHAT theory, the Change Laboratory, was therefore implemented in the two final studies, papers IV and V (the Change Laboratory method is described in detail later in this chapter). The purpose of the Change Laboratory intervention was to actively engage the teachers in a collaborative analysis of the online pharmacy programme, with the aim of resolving tensions within the programme and collaboratively developing academic practice and agency.

Conceptions of teaching and learning and approaches to teaching (CAT)

In the last two decades, an increasing number of studies have been carried out with a focus on examining teachers' conceptions of teaching and learning and their approaches to teaching (Martin et al., 2002; Marton, 1994a; Prosser & Trigwell, 2014; Trigwell et al., 1994). As discussed in the literature review, Chapter 2, two different research approaches can be identified in research into conceptions and approaches to teaching and learning (CAT): a phenomenographic approach and research approaches belonging to a broader, psychology-oriented approach. The methodological framework adopted to investigate CAT in this thesis builds on a model developed by Trigwell, Prosser and Taylor (1994) using a phenomenographic approach (Dahlgren & Johansson, 2015; Marton, 1981). The basic tenets of phenomenographic research are therefore presented to provide a

theoretical background and to highlight implications for the framework used in this thesis.

In phenomenography the primary interest is in surfacing variations in experiencing and understanding phenomena. It is based on the following proposition:

> Whatever phenomenon or situation people encounter, we can identify a limited number of qualitatively different and logically interrelated ways in which the phenomenon or the situation is experienced or understood. (Marton, 1994b, p. 4425)

When applied to educational research, phenomenography can be used to identify the various ways in which teachers and students see and experience the teaching and learning situation and can lead to the development of activities that support these (Prosser & Trigwell, 2014). Phenomenographic approaches are underpinned by a non-dualistic ontology where there is no separation between the individual and the world; the meanings of a phenomena are constructed on the basis of our personal experiences and context (Booth, 2012; Prosser & Trigwell, 1999b).

> There is not a real world 'out there' and a subjective world 'in here'. The world [as experienced] is not constructed by the learner, nor is it imposed upon her; it is constituted as an internal relation between them. (Marton & Booth, 1997, p. 13)

In other words, according to Marton and Booth, we may not all see the same thing in the same way. For instance, one teacher may see Edtech as an unwelcome intrusion and hindrance in their teaching while another may see it as offering opportunities and possibilities to enhance their students' learning. In phenomenographic analysis of teaching, it is what the teacher perceives to be true that is important since this perception has practical consequences (Prosser & Trigwell, 1999b). Consequentially, in the analysis of interview material in papers I and II, the data were not regarded as yielding a literal representation of reality, but as a narrative of the teachers' perceived conceptions and approaches to teaching. In phenomenographic analysis, the first step is to identify variation in data, often referred to as 'categories of description' (Marton, 1981). These categories are then inter-related in hierarchical form to capture 'the dimensions of variation' they suggest (Marton, 1981). The process of analysis is summarised by Marton:

> The first criterion that can be stated is that the individual categories should each stand in clear relation to the phenomenon under investigation so that each category tells us something distinct about a particular way of experiencing the phenomenon. The second is that the categories have to stand in a logical relationship with one another, a relationship that is frequently hierarchical. (Marton, 1981, p.125)

This process of analysis can be illustrated by research into university teachers' conceptions of teaching and learning and approaches to teaching carried out by Trigwell, Prosser and Taylor (1994). In their study, five qualitatively different approaches to teaching were identified that are structurally related in a hierarchy of inclusiveness, ranging from information transmission to facilitating learning through conceptual change (Trigwell et al., 1994).

- Approach A: A teacher-focused strategy with the intention of transmitting information to students.
- Approach B: A teacher-focused strategy with the intention that students acquire the concepts of the discipline.
- Approach C: A teacher/student interaction strategy with the intention that students acquire the concepts of the discipline.
- Approach D: A student-focused strategy aimed at students developing their conceptions.
- Approach E: A student-focused strategy aimed at students changing their conceptions.

From this perspective, an example could be that a teacher with approach A focusing on 'transmission of information', will usually adopt teacher-focused strategies where their focus is on the delivery of facts assuming that students do not need to be active in the learning process and have little or no prior knowledge of the subject. In contrast, in approach E the student is the focus of activities. The teacher encourages self-directed learning and allows time for students to interact and discuss and tries to develop a 'conversation' with students.

The approach to teaching adopted by the teacher has also been shown to be related to their conceptions of teaching (Trigwell & Prosser, 1996a) and perceptions of their teaching context (Prosser & Trigwell, 1997). This is of significance for this thesis, where the approach to teaching of the teachers is regarded as indicating their underlying conceptions of teaching and learning. There is also evidence that the way a teacher approaches teaching is related to the approach to learning adopted by students (Prosser et al., 2003; Trigwell et al., 1999). When teachers adopt student-focused approaches to teaching, students are more likely to adopt deeper approaches to learning than when taught by teachers with a teacher-focused approach to teaching (Trigwell et al., 1999). A critical component in the improvement of student learning is therefore the design of academic development activities that promote conceptual development and change in HE teachers to support the adoption of student-focused teaching practices.

The initial focus of the research was to explore variation in Edtech implementation in teachers on the online pharmacy programme. To realise this goal, a framework to investigate the teachers' underlying conceptions of teaching and learning and approaches to teaching was deemed necessary. The methodological tool provided by the five categories of approaches to teaching identified by Trigwell and Prosser (1994) was adapted and applied in papers I, II and III to identify approaches to teaching and approaches to teaching with Edtech. Questions arising from the results of papers I and II led to the application of a second theoretical framework CHAT. This enabled the exploration of how teaching practices at the micro-level of the individual are related to the collective meso-level of department or programme and to macro-level institutional structures.

Cultural-Historical Activity Theory (CHAT)

CHAT is a theoretical framework that has attracted growing interest from educational researchers over the last twenty years due to its ability to conceptualise individual teachers at micro-level and their environment at meso- and macro-level as a holistic unit of analysis (Yamagata-Lynch & Haudenschild, 2009). It offers a broad approach to analysing organisational and contextual issues and also supports a focus on multiple interacting activity systems (Foot, 2014; Gunn, Hill, Berg, & Haigh, 2016). CHAT is increasingly being applied in HE research consider the tensions and contradictions within educational contexts (V. Ellis et al., 2010; Kaatrakoski et al., 2016), to examine the introduction of Edtech into educational contexts (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2002; Benson, Lawler, & Whitworth, 2008; Issroff & Scanlon, 2002; Pettersson & Olofsson, 2013) and to investigate issues in the field of teacher training (V. Ellis et al., 2010; Jahreie, 2010). CHAT has also been used extensively to examine the use of Edtech because of its emphasis on the mediation of tools and social factors in human activity (Karasavvidis, 2009; Pettersson & Olofsson, 2013; Yamagata-Lynch et al., 2015).

Engeström (1996, 2001) describes three generations of CHAT research as distinct approaches to activity theory. He refers to Vygotsky's (1978) identification of mediated activity as the first generation of activity theory, emphasising the importance of his work as the conceptual basis for later generations of CHAT (Leont'ev, 1978, 1981). Second generation activity theory expands Vygotsky's concept of individual mediated activity to include collective activity (Engeström, 1987; Leont'ev, 1978, 1981) and the activity systems model (Engeström, 1987). Finally, Engeström refers to third generation of CHAT as the analysis of networks of activity systems (1999). The historical development and theoretical basis of the first two generations of CHAT are described in the following section, with reference to their use in this thesis. The application of CHAT analysis in

developmental work research is also discussed, where the researcher frequently takes a participatory and interventionist role in the activity to support change and development (Yamagata-Lynch, 2010).

First generation activity theory

CHAT has its roots in the sociocultural perspectives of Soviet psychology, primarily in the work of Vygotsky (1978, 1986). Central to Vygotsky's thinking is the idea that the individual's interaction with an object is mediated by cultural artefacts such as signs, symbols or practical tools (Cole & Engeström, 1993). Artefacts carry with them a history of use and are themselves altered, shaped and transformed when used in activities (Säljö, 1999). Correspondingly, individuals both shape and are shaped by the cultural tools mediating their actions (Cole & Engeström, 1993; Daniels, 2003). Figure 2. Represents what is frequently referred to as Vygotsky's basic mediation triangle (Cole & Engeström, 1993).

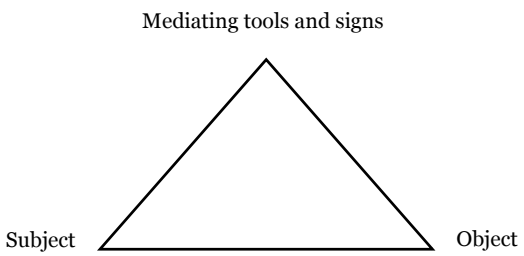

Figure 2. Vygotsky's basic mediated action triangle (adapted from Cole and Engeström, 1993)

Figure 2. illustrates how the individual interacts with the world by means of cultural artefacts. The world is never approached directly in the course of development of higher cognitive functions but is always mediated (Bateson, 1972; Wertsch, 1991). Knowledge is actively developed through the individual's engagement with mediating tools and signs to achieve the object of the activity. A tool can be either psychological (such as culture, language, and ways of thinking) or material (such as a pen and paper or a computer).

Vygotsky was primarily concerned with mediation and learning located at the level of the individual, however his conceptual model does not develop an analytic framework capable of situating learning in a wider context that accounts for the collective nature of activities (Engeström, 1987). The concept of mediation connects the different strands within sociocultural theories of learning. However, the incorporation of social and historical dimensions in second generation CHAT separates Vygotsky's individual, mediated activity perspective from CHAT (Roth & Lee, 2007).

Second generation CHAT

Leont'ev widened the scope of activity theory, shifting the focus of attention from the tools employed to achieve the goal to the focus or the object of the activity. He also introduced the notion of collective activity, establishing activity as a social endeavour involving more than one individual (Leont'ev, 1978; Roth & Lee, 2007).

According to Leont'ev (1978), individual learning and development is part of a collective activity, such as the collaborative development of an online pharmacy programme, that also involves a division of labour (e.g. work shared between subject teachers, educational developers, management etc.), rules (e.g. programme policy, national and local regulations) and community (e.g. the teaching-team or departmental colleagues). Further, what distinguishes one activity from another is the difference in their objects and it is the object of the activity that signifies the motive (Leont'ev, 1978). The individuals' mediated actions are oriented towards a shared object; a collective focus or purpose. How the object is understood by the participants in an activity directs the form of activity itself. For example, a teacher who perceives research to be prioritised by the institution may act differently when carrying out the activity of teaching than one who perceives teaching to be valued by the institution.

Although Leontiev's conceptual framework introduces a collective component it does not seem to illustrate how the community or division of labour impacts on individual actions in a collective activity. However, building on the work of Leont'ev, Engeström (2011) developed an organising structure that graphically illustrates collective activities and cooperative work, emphasizing the mediational role of the community and that of social structures such as the division of labour and rules.

Engeström (1987) introduced the notion of the activity system as a historical and social activity emphasising that the components of an activity system are not static; they continuously interact with each other and evolve over time (Barab et al., 2002). As shown in Figure 3, the subject(s) act on the object in order to transform it using mediating artefacts or tools in order to arrive at specific outcomes. In turn, the subjects' position is influenced by the rules of the system, their community and the division of labour (Daniels, 2003; Engeström, 1987).

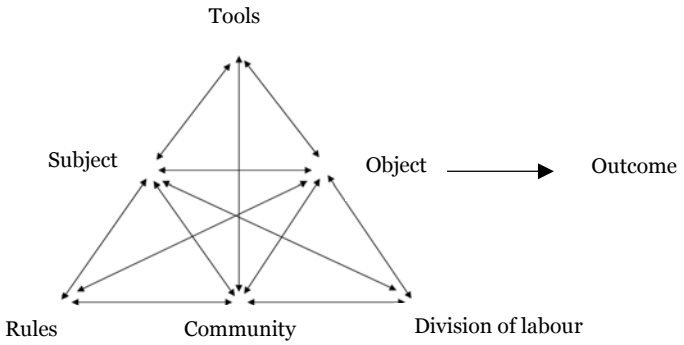

Figure 3. Illustration of Engeström's (1987) conceptual model of an activity system

If we consider the case of a teacher on the online pharmacy programme, for example, the object of the activity is to support the student engaged in studying on the programme. The outcome for the student is the successful completion of the activity i.e. qualification as a pharmacist. Digital tools may include an online discussion forum, virtual learning environment (VLE) or other tools used to support the development of understanding and the learning process. The community consists of the teachers and their community of practice (the teaching-team working on the programme or departmental colleagues), the division of labour (how work is shared between subject teachers, educational developers, management etc.). Finally, the rules are the explicit and implicit norms governing the community (programme policy, national and local regulations and strategy). Engeström's (1987) conceptual model of the activity system was used in paper III as an analytical tool to analyse the sociocultural and structural context of the teachers on the online pharmacy programme.

Contradictions, change and development

Activity systems are never in perfect equilibrium. They are riddled with inner contradictions that can only be resolved by transforming the activity systems (Engeström, 2001). In expansive transformations, the community learns to widen its object and possibilities for action by re-designing its own activity (Engeström, 2001). From a CHAT perspective, change and development in activity systems are driven by the solution of contradictions occurring within and between activity systems (Engeström, 1987; Ilyenkov, 1977). Contradictions are defined by Engeström as "historically accumulating structural tensions" (2001, p. 137) and can occur on four levels (see Table 2.) Contradictions are frequently grounded in concrete problems that affect the participants' practice. For example, in an interdisciplinary programme such as the online pharmacy programme, primary contradictions can arise between members of the teaching-team representing different subjects concerning the aims of the programme; to

produce competent pharmacists or to encourage students to pursue an academic career. An example of a secondary contradiction might be between rules governing allocation of resources within the programme and the division of labour. Tertiary contradictions occur between the objects of the different departments involved, where the object of a research-intensive department is in conflict with that of a teaching-focused department. Finally, quaternary contradictions can arise for example, between the strategies and rules governing the programme and those imposed by the institution.

Table 2. Levels of contradictions

Contradictions	Explanation
Primary	Contradictions within components of an activity system in relation to conflicting value systems (e.g. within the community).
Secondary	Contradictions between components of the activity (e.g. between rules and division of labour).
Tertiary	Contradictions between the objects of two activity systems (e.g. between the activity system of research and that of teaching).
Quaternary	Contradictions between components of two different but connected activity systems (e.g. between the rules governing the institution and those governing the programme).

In order to explore contradictions it is necessary to analyse their manifestations (Engeström & Sannino, 2011), which may include disturbances or double binds, defined as "two messages or commands, which deny each other" (Engeström, 1987, p. 142). The participants of the activity system are forced to question and analyse their practice. Such an analysis can lead to innovative attempts at development if participants have the opportunity to work collaboratively to solve them. By analysing disturbances participants are able to develop an awareness of the causes and roots of contradictions, which in turn can facilitate the development of a solution (Engeström, 2011; Engeström & Sannino, 2010). For example, in the online pharmacy programme the increased diversification of the programme over twelve years resulted in organisational and structural conflicts within the programme. As seen in paper IV, the historical analysis of manifested contradictions by teachers during a Change Laboratory intervention can reveal the roots of the problem resulting in a solution for increased collaboration between teachers working on individual modules.

Expansive learning

The cyclical process of analysing and solving contradictions forms the basis of Engeström's (2001) theory of expansive learning, where "contradictions are the necessary but not sufficient engine of expansive learning in an activity system" (Engeström & Sannino, 2010, p. 7). Contradictions can become a driving force of expansive learning if the participants of the activity system have the opportunity

to identify and historically analyse the contradiction, creating a new, expanded object (Engeström, 2001, 2011). In expansive learning, the activity is transformed from an individual to a collective activity system. Individuals begin to question the existing activity and as more participants join in, a collaborative analysis and modelling of a new solution takes place. Expansive learning results in the formation of a new expanded object and activity oriented to that object (Engestrom, 1999; Engeström, Sannino, & Virkkunen, 2014). The expansive learning cycle is a stepwise process involving seven phases called learning actions (Engeström, 2001; Virkkunen & Newnham, 2013). An ideal-typical sequence of learning actions in an expansive learning cycle can be described as follows (Engeström & Sannino, 2010):

- The first action is that of questioning, criticizing or rejecting some aspects of the practice, such as the structure of a programme.
- The second action is that of analysing the situation. Analysis commonly involves discussion of the situation to find out causes or explanatory mechanisms. It seeks both to examine the current situation and to trace its origins and evolution.
- The third action is that of modelling; constructing an explicit, simplified model of the new idea that explains and offers a solution to the problematic situation.
- The fourth action is that of examining the model, running, operating and experimenting on it in order to fully grasp its potentials and limitations.
- The fifth action is that of implementing the model by means of practical application.
- The sixth and seventh actions are those of reflecting on and evaluating the process and consolidating its outcomes into a new stable form of practice.

The Change Laboratory

With the aim of promoting change and development in workplaces, Engeström et. al. (1996) developed an intervention method, the Change Laboratory as a method for studying change and development through expansive learning. Change Laboratories are an application of the method of expansive learning (Engestrom, 1999; Engeström, 2001) and double stimulation (Vygotsky, 1978). Interventions are designed so that participants are faced with tasks that call for expansive learning actions and follow the methodological steps of the expansive learning cycle. A Change Laboratory intervention involves successive cycles of identifying and formulating problems, questioning previous problem formulations and conceptions in the search for the core source of problems and modelling new ways of working, as illustrated in Figure 4 (Virkkunen & Newnham, 2013).

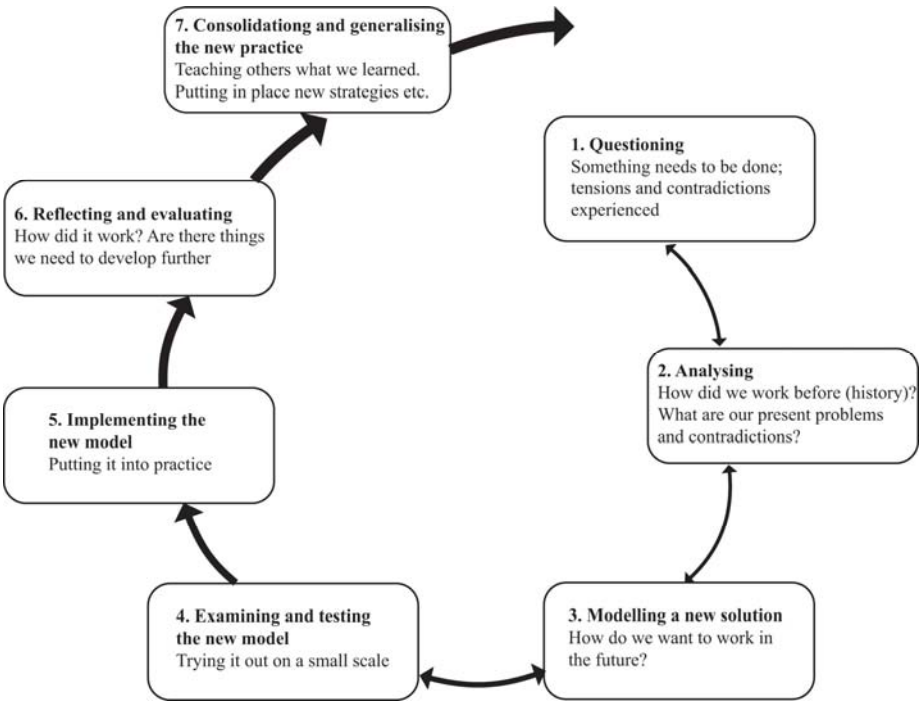

Figure 4. Expansive learning cycle (adapted from Engeström 1987)

The Change Laboratory method employs the Vygotskian principal of 'double stimulation' (Vygotsky, 1987), involving two sets of stimuli with different roles (Sannino, 2015b). The *first stimulus* is provided by the presentation of concrete examples of tensions or disturbances in the working practices of the participants by the researcher. For example, in paper IV, the examples used were drawn from focus group interviews with students and student course evaluations. The mirror material is used to provoke collaborative efforts and engagement by the Change Laboratory participants (e.g. teachers) to seek solutions to the contradictions experienced. The analysis and resolution of problems identified is facilitated by the introduction of conceptual tools such as the triangular activity system model (Figure 3) as a *second stimulus*. Using the second stimulus as a tool, participants are able to analyse the object of their collective activity, in this case the online pharmacy programme, to examine how rules and division of labour have emerged historically, how the community functions, how tools are used and how these components may be changed for the better. During the analysis and modelling process participants move between past, present and future scenarios, facilitating

discovery of the historical origins of the problems and expression of ideas of possible future ways of working.

The Change Laboratory method was used in papers IV and V to explore the collaborative solution of tensions within the online pharmacy programme and the development of collaborative agency among the teachers. The model of expansive learning is useful when exploring open-ended processes, such as academic change and development, where the problem and its solution are not pre-defined (V. Ellis et al., 2010). Using an interventionist approach such as the Change Laboratory, contradictions not immediately visible to the participants can be identified, analysed and solutions collaboratively developed (Sannino, 2010).

Summary

The theoretical frameworks of CAT and CHAT provide methodological tools for the analysis of teaching practice in context. From a phenomenographic perspective, research into CAT explores the relations between conceptions, approaches and outcomes in learning and teaching taking into account the teacher's perception of the context as well as the experiences of the individual teacher at micro-level (Prosser & Trigwell, 1997). The application of CHAT enables analysis of sociocultural interactions, the impact of community, rules and the division of labour conceptualising individuals and their environment as a holistic unit of analysis at meso- and macro-level.

There is however some criticism of the phenomenographic approach used by much CAT research (Ashworth & Lucas, 2000; G. S. Åkerlind, 2012). One criticism is that the variations it identifies often result in neatly hierarchised categories that prohibit more nuanced and complex understandings. Further, that categories not deemed as 'suitable' by the researcher may be ignored (Webb, 1997). A further criticism of phenomenography is the assumption that the researcher is neutral both in the interview situation and analysis and in the development of categories (Richardson, 1994; Webb, 1997). As commented by Orgill (2007) "It is more reasonable to assume that researchers have certain experiences and hold certain theoretical beliefs that will influence their data analysis and categorisation." (p. 134).

Of significance for this thesis is the fact that phenomenographic studies rarely include wider contextual factors, such as the teaching culture of the department or the impact of institutional policy and strategy in their analysis. As previously mentioned, from a phenomenographic perspective there is no separation between individuals and the world or between reality and experience. Because phenomenology is concerned with relationships between ways of experiencing rather than the impact of context on experiences, there is no broad and significant

engagement with the context in which teaching and learning take place (Ashwin & McLean, 2005). The wider sociocultural or structural dimensions of context are to a great extent unexplored in phenomenographic studies. For the reasons mentioned above, a sociocultural theoretical framework was chosen to extend the analysis provided by CAT.

The sociocultural framework of CHAT has as its starting point a dialectical relationship between the individual and the collective (Roth & Rückriem, 2005). Similar to CAT research, there is a focus on what teachers do in practice, however CHAT also enables analysis of sociocultural interactions, the impact of community and how cultural resources are negotiated, transformed and used in interactions. From a CHAT perspective, teachers' academic development should be understood within their sociocultural and structural context and this theoretical framework enables a wider, holistic view of teaching practice in HE.

Both frameworks have advantages and disadvantages: CAT research provides methodological tools enabling rich description of the individual teachers' experiences and practice but does not enable exploration of the wider sociocultural or structural context; CHAT provides methodological tools enabling a holistic view of teaching practice but does not answer questions concerning the individuals' unique biography and variations in conceptions of teaching and learning and approaches to teaching.

By combining the frameworks of CAT and CHAT, different aspects of academic practice can be illustrated, providing a richer understanding of the factors underlying academic change and development.

4. Methodology and methods

This chapter considers the methodology and the methods used in this thesis. It begins by considering the challenges in the research process, followed by the context of the research and the methods and analysis. The chapter concludes with some ethical considerations and reflections on the role of the researcher.

Research process and methodology

The aim of this thesis is to explore factors that impact on academic change and development in a HE teaching and learning environment supported by Edtech. In order to achieve this, the studies explored change and development at three levels:

- at the micro-level of the teacher investigating conceptions and approaches to teaching with Edtech
- at the meso-level of the department or programme exploring contextual sociocultural factors
- at the macro-level of the higher education institution exploring contextual structural factors

The exploration of academic change and development at the micro-, meso- and macro-levels of practice was considered necessary to enable a more holistic understanding of the eco-systems present in higher education (HE) institutions. It enables a deeper understanding of factors influencing change at all three levels and the consideration of the interrelationships and interdependencies between these factors.

The research process developed over a period of time, from 2004 to 2016. The questions evolved dynamically, based on cumulative research and findings and in addressing the changing context of the institution and the circumstances of the participating teachers. As discussed in Chapter 3, to explore and understand the complexity of teaching in HE with Edtech, this thesis used two theoretical frameworks: conceptions of and approaches to teaching (CAT) and Cultural-Historical Activity Theory (CHAT). The two theoretical perspectives illuminated different aspects of academic practice at different levels providing a rich understanding of factors underlying academic change and development. At micro-level CAT was used to explore changes in the conceptions and approaches to teaching of individual teachers. At meso-level CAT and CHAT were combined to elucidate the interplay between individuals' conceptions and approaches to teaching and the sociocultural influence of the department or programme.

Finally, at macro-level, CHAT was applied to explore the impact of institutional structural factors.

The research process of this thesis departs from a typical monomethod research by examining change and development from a range of perspectives. A mixed-methods approach was adopted, conducted within a pragmatist paradigm (Onwuegbuzie & Leech, 2005; Teddlie & Tashakkori, 2009). This is necessary in order to appropriately explore real-world situated phenomena (Creswell & Plano, 2007; Johnson & Onwuegbuzie, 2004). The reason behind this choice is that pragmatism is practice-driven, oriented to the solution of practical problems in the practical world (Denscombe, 2008) and suggests that 'what works' to answer the research questions is the most useful approach (Cohen, Manion, & Morrison, 2011). As a consequence, the research is driven by the research questions rather than by the methodology. Accordingly, the methods used in this thesis have been chosen to elicit the most appropriate data to address particular research questions in varying phases of the research process.

A pragmatic, pluralistic approach to deriving knowledge about activities and problems in real-world practice-oriented situations was adopted in this thesis (Creswell & Plano, 2007; Johnson & Onwuegbuzie, 2004). The use of methodological triangulation enabled a comprehensive examination of the research questions from more than one perspective (Cohen, Manion, & Morrison, 2011; Creswell, 2003). As argued by Cohen et al. (2011), research methods are never entirely neutral and can act as filters through which the object of investigation is selectively experienced. Using one particular method exclusively may therefore bias the researcher's interpretation of the phenomena being investigated. Denzin (1970) proposed several types of methodological triangulation, including time triangulation, combined levels triangulation, theoretical triangulation and methodological triangulation. In this thesis, teacher interviews and student course evaluations are combined to provide a comprehensive picture of teaching practice on the pharmacy programme. Further, factors influencing the change and development process are explored utilising a longitudinal design to try to establish stability of observations over time. Finally, the teaching and learning environment of the online pharmacy programme is examined on three levels, micro-, meso- and macro-level, to explore academic change and development. The benefits of this approach include "increasing confidence in research data, creating innovative ways of understanding a phenomenon, revealing unique findings, challenging or integrating theories, and providing a clearer understanding of the problem" (Thurmond, 2001, p. 254).

A 'conversion mixed design' (Teddlie & Tashakkori, 2006, p.17) was adopted in which numerical and qualitative data-types are integrated in papers I, IV and V

in answering the research questions by 'transforming' data (Cohen et al., 2011; Teddlie & Tashakkori, 2009). Qualitative data are 'quantitized' in paper I by comparing categories of approaches to teaching with Edtech over time, making possible the identification of factors that caused changes, which were then represented quantitatively. In papers IV and V, data were 'quantitized' by applying frequency counts to categories of speech expressing, for example, types of expansive learning or agency in order to establish change and development (Teddlie & Tashakkori, 2006, p. 27).

The complementary theoretical frameworks applied have methodological implications for data collection. However, as emphasised by Onwuegbuzie & Leech (2005), the use of a mixed-methods approach makes visible similarities between the different ontologies and epistemologies of the theoretical frameworks (here CAT and CHAT) rather than the differences. Both theoretical frameworks explore reality as perceived by the participants, CAT on the micro-level of the individual and CHAT on the meso-level of the teaching-team or community; both regard practice as context-bound; both describe data and construct explanations about the reasons why outcomes are as they are; and both complement and corroborate each other in this thesis providing possibilities for a deeper understanding of academic change and development in HE (Biesta & Burbules, 2003; Feilzer, 2010).

Although it is clear that a mixed methods approach has much to offer, there have been criticisms of its use (Teddlie & Tashakkori, 2009). The bulk of criticism focuses on the irreconcilability of quantitative and qualitative research methods due to epistemological and ontological differences, rather than focusing on similarities, as noted above. Onwuegbuzie (2007) however argues that "pragmatism offers an epistemological justification [...] and logic [...] for mixing approaches and methods" (p. 125). Other criticisms of a mixed methods approach are more practical in nature concerning; the need for the researcher to have a working knowledge of multiple methods and approaches and understand how to mix them appropriately (Cohen et al., 2011). Further criticism is that it can be difficult for a single researcher to carry out both qualitative and quantitative research especially if two or more approaches are expected to be used concurrently and that it can be more time-consuming and expensive (Hanson, 2008; Johnson & Onwuegbuzie, 2004).

The context for the study

To explore factors that may impact on academic change and development in a technology-rich educational context, a longitudinal study of teachers on an online pharmacy programme at a university in northern Sweden was carried out. This 12-year longitudinal study (2004 – 2016) encompasses data from an online three-

year Bachelor of Science in Pharmacy programme (BSc Pharm). During the twelve-year period the programme has undergone organisational and structural changes, for example, from 2010 onwards a two-year Master in Pharmacy (MPharm) programme was added and from 2011 a five-year Master of Science in Pharmacy (MSc Pharm) programme was developed. The Bachelor of Science in Pharmacy programme (BSc Pharm) was originally developed in 2003 in response to the need for qualified pharmacists in rural, sparsely populated areas in Sweden and at its inception 2003 was the only online pharmacy programme in Europe (Nordström & Englund, 2004). Around 25 teachers are currently involved in the delivery of the programmes, although many of the individuals have changed over the 12-year period. The programme was designed and implemented specifically as an online programme and does not have a campus-based equivalent at the university. This is of particular relevance, as in contrast to many studies of academic practice in an online environment, this thesis does not involve a transition from a traditional to a digital environment (Buchan, 2011; Pettersson, 2015). Of further significance is the interdisciplinary organisational structure of the programme. Responsibility for delivery of modules on the programme is distributed between three departments A, B and C. Department A is the formal host of the programme. The departments are split between two faculties: the Faculty of Natural Sciences (A and B) and the Faculty of Medicine (C). A programme board consisting of chairperson from the host department, two representatives from each department and student representatives is responsible for joint management of the programme. Over the course of the study, responsibility for delivery of course modules on the programme has shifted. Prior to 2016 the distribution of modules was 59 % department A, 14 % department B and 27 % department C. From 2016 the distribution is 16 % department A, 14 % department B and 70 % department C (interview with programme management, 2016).

The programme is delivered almost entirely online, with one or two campus meetings for laboratory work per semester. A virtual learning environment (VLE) is used for delivery of digital course materials and administration. Lectures, seminars and tutorials as well as teacher-student communication and student-student communication are facilitated by means of the VLE, Adobe Connect ®[2], e-mail and discussion forums. From 2008 Wikis and podcasts were included and from 2009, as explored in paper III, an immersive three-dimensional virtual world (3DVW), OpenSim ®[3], was also implemented. A virtual pharmacy and hospital were created in the 3DVW, providing students with opportunities to interact and practice communication with customers, patients and colleagues in

[2] Adobe Connect http://connect-innovation.com/adobe-connect/meetings

[3] A virtual environment including a pharmacy and hospital created in Open Simulator http://opensimulator.org/wiki/

a professional manner. Use of Edtech on the program is blended with personal meetings with teachers and laboratory work. More than thirty teachers were involved in the development and implementation of the program in 2003, although only approximately one third have been engaged with the program for the entire ten-year period studied. Table 3 illustrates student and teaching staff numbers for the programs.

At inception of the online pharmacy programme in 2003, only two of the 24 teachers included in the data set had prior experience of teaching with Edtech. To offset this lack of prior experience, an in-service training programme was offered to the teachers involved in the programme. This induction programme consisted of three phases: a workshop on the background and development of the BSc Pharm, a series of seminars on, among other things, online pedagogy, collaborative learning, video streaming, simulation and visualisation and finally practical training in the technology used on the programme. Technical support has consistently been provided for teachers on the programme by the university Centre for Educational Development on a consultative basis. Initially this support was extensive but over the 12-year period it has been gradually reduced as the Edtech competence of the teachers has increased. With regard to teaching experience on campus, six had no prior teaching experience while the remaining eighteen teachers ranged in experience from one to thirty years. Similarly, seven teachers had never participated in academic development activities, while the majority had completed the national mandatory requirement of ten weeks of pedagogical courses.

Table 3: Number of teachers and total number of students on the programme.

	2004	2008	2011	2014	2016
Number of teachers	30	30	30	28	25
Number of students on programmes	178 BSc Pharm	194 BSc Pharm	158 BSc Pharm 31 MPharm	121 BSc Pharm 47 MPharm 52 MSc Pharm	96 BSc Pharm 47 MPharm 73 MSc Pharm

Data collection

In order to explore factors impacting on academic change and development at micro-, meso- and macro-levels and to answer the research questions of the thesis, a mixed-methods approach to data collection and analysis was used. Data collection methods for the complete set of data in the thesis included interviews, observations, student evaluation surveys and document analysis. The data was collected over a twelve-year timespan, to enable exploration of change and

development over time. Table 4 provides an overview of the amount and chronological order of empirical data collected.

Interviews

The principal source of empirical data at micro-level are semi-structured interviews (Kvale & Brinkmann, 2009; Sapsford & Jupp, 1996). In total 47 semi-structured interviews were carried out with 24 teachers at six points over a 12-year period: 2004, 2008, 2011, 2014, 2015 and 2016. In addition, four teachers from a nursing programme were interviewed 2016 to complement data from the online pharmacy programme concerning experiences of teaching in a 3D VW.

Table 4. Chronological outline of data collection process 2004-2016.

Data	**2004**	**2008**	**2011**	**2014**	**2015**	**2016**
Other data	Student evaluation Institutional policy and strategy documents	Student evaluation Institutional policy and strategy documents	Student evaluation Institutional policy and strategy documents	Student evaluation Institutional policy and strategy documents	Institutional policy and strategy documents	Institutional policy and strategy documents
Interviews used in Paper I	7	7	7	9		
Interviews used in Paper II					4	4 (Nursing)
Interviews used in Paper III	8	10	13	10		6
Interviews used in Paper IV				Change Laboratory observation 9 x 1 ½ hours		6
Interviews used in Paper V				Change Laboratory observation 9 x 1 ½ hours		6
Total number of interviews	**10**	**10**	**13**	**10**	**4**	**6 (+4 Nursing)**

Throughout the 12-year period of data collection, the semi-structured interviews followed the same basic interview protocol (Kvale & Brinkmann, 2009). They contained questions common to all interviews while also allowing deper investigation into specific issues pertinent to the research. Common questions occurring throughout the research included: background information such as teaching experience, use of Edtech and participation in academic development

and were also designed to elicit the approaches to teaching and underlying conceptions and motives that informed the teachers' practice and use of Edtech. Focused questions comprised, for example, experiences of teaching in virtual worlds, the sociocultural context of the department and programme and participation in the Change Laboratory (Denzin & Lincoln, 2008). Translated summaries of the interview guides are provided in the appendices (pp. 86-92).

Interviews were approximately one hour in length and were conducted at a time and place convenient to the respondent. All interviews were conducted in Swedish, audio-recorded, transcribed and translated by the researcher (Hammersley & Atkinson, 2007; Peräkylä, 2008). The interviewees' contributions were anonymised and stored according to research ethics regulations (British Educational Research Association, 2011; Swedish Ethical Review Board, 2004). Qualitative software (NVIVO® ver.10) was used to record, store and organise the data (Bazely & Jackson, 2013; Coffey & Atkinson, 1996). The interviewees received a participant information sheet concerning the purpose of the study prior to participation and gave their written consent for the data gathered to be used in this study (Cohen et al., 2011).

Sampling

To facilitate the longitudinal design of paper I, purposive sampling (Cohen et al., 2011; Silverman, 2013) of the teachers was necessary to select participants within the time span 2004 to 2014 and was also used in paper II to identify respondents actively involved in using 3DVWs in their teaching. In paper II, four teachers from the online pharmacy programme and four teachers from the online nursing programme participated. The purpose and implementation of the virtual environment was similar for both programmes; teachers from both programmes were therefore included to increase the number of participants in the study. In paper III data from the nine teachers, who participated in paper I were complemented with interview data from an additional 16 teachers to provide more detail concerning departmental teaching contexts. Purposive sampling was used to identify teachers from the three departments A, B and C contributing to the programme (Cohen et al., 2011). With regard to papers IV and V, participation in the Change Laboratory intervention was voluntary; an invitation to participate and a brief description of the activity were sent to teachers, management and student representatives by the researcher. Altogether 12 participants, comprising three members of the programme board (who were also teachers on the programme), eight teachers and one student representative, took part in the Change Laboratory intervention. Six of the participants were from department A, four from department C and the remaining two were the student representative and an online tutor not stationed at the university. A request to participate in

follow-up interviews was sent after two years to all Change Laboratory participants; six participants replied positively and were interviewed.

Student surveys

Increasing evidence suggests that student evaluations are valid and reliable indicators of teaching quality (Benton, Cashin, & Kansas, 2012; Marsh, 1987; Spooren, Brockx, & Mortelmans, 2013). To provide an indication of student satisfaction with the quality of teaching on the program and changes over time, annual student course evaluations were therefore used in paper I. Two questions in congruence with Ramsden's (1991) Course Experience Questionnaire (CEQ) were used to indicate student satisfaction with teaching quality and aspects such as course design, delivery and examination. An average of the mean values of the students' responses to the two questions was used to illustrate student satisfaction with the courses taught by the respondents over 10 years.

Documents

Documents analysed to provide structural contextual data for the period 2004-2016 are shown in Table 5. General institutional strategy documents and policy and strategy documents concerning teaching and learning, teaching rewards system and development project funding were collated for the 12-year period to provide contextual data concerning macro-level factors at institutional level. All documents fitting the selection criteria were used, and were gathered from the university administration department and website. National quality assurance policy documents for the period were also included to provide contextual data on structural factors at national level.

Table 5. Institutional and national policy and strategy documents for the period 2004-2016.

Source	**Sampling regime**	**Rational**	**Sample size**
Institutional documentation 2004-2016 with a focus on vision and strategy, teaching and learning. National quality assurance policy.	Purposive sampling. Documentation of overall university strategy and policy, teaching and learning strategy, teaching rewards system and development project funding.	Historical and current aspects of contextual factors at institutional and national level, e.g. overall strategy, teaching and learning strategy, teaching rewards system and development project funding.	Institutional policy and strategy - 8 documents Swedish national quality evaluation policy - 3 documents **11 documents in total**

The Change Laboratory: observations

To explore academic change and development at the meso-level of teaching-teams a Change Laboratory intervention was carried out spring 2014 over a period of five months. As described in Chapter 3, a Change Laboratory is an interventionist method based on the tenets of CHAT designed to support participants in redesigning their working practices (Engeström, 2000). Data were collected before, during and after the Change Laboratory intervention. Prior to the intervention concrete examples of tensions or disturbances in the working practices of the participants were collected by the researcher. For example, in paper IV, the examples used were drawn from focus group interviews with students and student course evaluations.

As a consequence of the online delivery mode of the programme, some teachers are geographically dispersed throughout Sweden. Although the majority of the teachers who took part in the Change Laboratory were physically present, between one and three participants at every session participated virtually using web conferencing software Adobe Connect®. This also necessitated the use of digital screens and tools to show mirror material and as far as possible to facilitate collaborative work. During the intervention, which consisted of nine sessions of 90 minutes each, all sessions were video-recorded using Adobe Connect® software. This made possible the simultaneous recording of activity in the room, via the camera mounted on the screen, the activity of teachers participating virtually via their individual web cameras and digital presentations and other material shown using the computer screen. The Change Laboratory method draws on qualitative methods to generate a close understanding of context (Miettinen, 2005). The recordings of activity during the intervention sessions were used as observational material in the analysis of interactions and discussions between participants (Hammersley & Atkinson, 2007). The nine video-recorded sessions were also transcribed and translated by the English-speaking researcher. Semi-structured interviews were carried out with six of the original Change Laboratory participants after two years.

Methods of analysis

An overview of the research questions, data collection and analysis methods and level of analysis is provided in Table 6. To explore how teachers' conceptions of and approaches to teaching and learning with Edtech change and develop over time (RQ 1) a phenomenographic approach was adopted in the analysis of the interview material in paper I. The five categories of approaches to teaching (Trigwell et al., 1994) were used as a framework for the identification of the teachers' approaches to teaching at the four periods in time, 2004, 2008, 2011 and 2014, providing an indication of change and development at micro-level. Although phenomenographic research methods are purely qualitative, they can,

as previously discussed, be 'quantitized' (Teddlie & Tashakkori, 2006). By comparing categories over time it is possible to identify changes, which can then be represented quantitatively. The student course evaluations used in paper I were also used to triangulate results by providing an indication of student satisfaction with the quality of teaching on the online pharmacy programme.

Table 6. Overview of the data collection and analysis methods employed to address the research questions.

Purpose	Question	Level of analysis	Data collection method	Data analysis method
Paper I: To explore how teachers' conceptions of and approaches to teaching and learning with technology change and develop over time.	RQ 1: How can individual higher education teachers be supported to facilitate academic change and development?	Micro-level: individual teacher	Student course evaluation surveys Teacher interviews	Statistical analysis Thematic analysis, approaches to teaching categories
Paper II: To explore how teachers' approaches to teaching with Edtech and conceptions of teaching and learning with technology influence the implementation of three-dimensional virtual worlds.	RQ 1: How can individual higher education teachers be supported to facilitate academic change and development?	Micro-level: individual teacher	Teacher interviews	Thematic analysis, approaches to teaching categories
Paper III: To explore how sociocultural and structural contextual factors impact on the way university teachers conceptualise and approach teaching and learning.	RQ 2: What sociocultural and structural contextual factors support or hinder change and development in higher education academic practice?	Micro-level: individual teacher Meso-level: disciplinary context/ community of practice Macro-level: institutional context	Teacher interviews Teacher interviews Institutional policy and strategy documents	Thematic analysis CHAT analysis (contradict-ions) Document analysis
Paper IV and V: To explore how the Change Laboratory intervention can facilitate participants' collaborative analysis and development and development of transformative agency.	RQ 3: How can higher education teachers be supported to collaboratively change and develop academic practice as a group?	Meso-level: programme team/teaching team (team-based development)	Observation of Change Laboratory activity Teacher interviews	Change Laboratory analysis of discourse Thematic analysis

The categories of approaches to teaching, applied in paper I, were also used in paper II to try to gain a richer understanding of how teachers' conceptions of teaching and learning influence the design of learning activities in technology rich

learning environments at micro-level (RQ 1). Thematic analysis was used to analyse interview data (Braun & Clarke, 2006; Coffey & Atkinson, 1996). The interview transcripts were read iteratively by the researcher to gain an initial overall sense of the data. The interview data was then read again and coded to produce an initial code list. From this basis the data were then coded selectively in terms of emergent themes and compared with the categories of approaches to teaching (Trigwell et al., 1994).

To examine how sociocultural and structural contextual factors impact on teachers' approaches to teaching with Edtech at micro-, meso- and macro-levels (RQ 2), interview data were combined with document analysis using a CHAT framework to analyse interactions and relationships within the sociocultural and structural HE context. In the first phase, thematic analysis was used to analyse interview data (Braun & Clarke, 2006; Creswell, 2007), which were transcribed verbatim. The data were analysed focusing on the participants' conceptions of teaching and learning and contextual factors perceived as contributing to any changes in these conceptions. The data were then re-examined and deductively coded with reference to components of CHAT: subject, object, tools, community, rules and division of labour. This was conducted for the activity systems of the respondents: departments A, B, and C. These systems were then compared and contradictions within and between systems identified. In the second phase policy and strategy documents were analysed to provide background contextual data concerning structural factors including university policy and strategy and national policy for quality evaluation of HE programmes. Initially the documents were read by the researcher to identify relevant passages of text. They were then re-read iteratively and thematically coded focusing on the contextual factors identified by participants in interviews analysed in phase one (Bowen, 2009; Hodder, 2000).

With regard to the third research question, how HE teachers can be supported to collaboratively change and develop academic practice as a group, analysis of data took place in several steps. The nine video-recorded sessions were transcribed and translated by the English-speaking researcher. As a first step, the transcribed material was analysed to identify expansive learning actions by specifying the epistemic function of each speaking turn using the framework of the seven expansive learning actions proposed by Engeström (1987). As a second step, the transcribed data was analysed to trace the emergence of tensions and contradictions in the expansive learning process, where participants were forced to question and analyse present practices. Thirdly, to explore the development of agency among participants, speaking turns containing expressions of transformative agency were analysed in detail using a category framework to determine transformative agency in conversations among participants (Haapasaari et al., 2016). These were coded according to the six expressions of

participants' emerging agency proposed by Haapasaari et al (2016): resisting, criticising, explicating, envisioning, committing to actions and taking actions. The video recordings of the sessions were used to provide visual confirmation of the actions identified.

The follow-up interview questions were semi-structured and participants were asked to reflect on the Change Laboratory process and describe any changes and developments in practice occurring after the intervention. The transcript data were thematically analysed (Braun & Clarke, 2006; Creswell, 2007). Initially, segments were identified that related to the sustainability of solutions developed during the activity, experiences of the process and development of agency. The three categories were then re-examined working iteratively through the transcript data to identify themes relating specifically to the research questions.

Summary

The methodologies and methods used in the thesis have been chosen:

- First, because they enabled exploration of the individual experiences of teachers associated with academic change and development in a HE teaching and learning environment supported by Edtech (micro-level).
- Second, because they enabled exploration of complex social relationships and a potential for understanding change and development within its social, cultural and historical context in a HE teaching and learning environment supported by Edtech (meso-level).
- Third because they offer a broad overview of the interrelated structural factors that potentially impact change and development in a HE teaching and learning environment supported by Edtech (macro-level).

Trustworthiness

This thesis adopts a pragmatic, sociocultural and interpretivist research approach which necessitates the application of appropriate evaluative criteria. Lincoln, Lynham and Guba (2011) have suggested that the concepts of credibility, transferability, dependability and confirmability are more appropriate in the evaluation of qualitative research than traditional concepts such as validity and reliability. These criteria have therefore been applied to the thesis and are briefly discussed below.

Credibility

Credibility asks whether the participants' constructions of reality have been accurately understood and reconstructed by the researcher (Lincoln & Guba, 1985; Lincoln et al., 2011). Several strategies to achieve credibility are suggested

(Merriam, 2009) including member checks, peer review prolonged engagement and triangulation. In this thesis, member checks and peer review were interwoven with prolonged engagement over the course of the thesis. Preliminary results and interpretations have been discussed with doctoral colleagues, supervisors and several participants in the studies. My prolonged engagement in the research process over twelve years enhanced credibility by provided the opportunity to gather a significant amount of data and to increase rapport and trust with the participants. As previously discussed, the use of methodological triangulation in this thesis enabled a comprehensive examination of the research questions from more than one perspective (Cohen, Manion, & Morrison, 2011; Creswell, 2003). Interview data were combined with student evaluation surveys and document analysis making it possible to validate and extend the analytical claims of the thesis (Coffey & Atkinson, 1996; Cohen et al., 2011). Further, the combination of the theoretical frameworks of CAT and CHAT illuminated different aspects of academic practice at different levels providing a rich understanding of factors underlying academic change and development from a longitudinal perspective.

Transferability

Transferability as defined by Kvale and Brinkman (2009) refers to "the extent that findings in one situation can be transferred to other situations" (p. 324). According to Guba and Lincoln (1994), transferability can be brought about by thick descriptions of the context and findings. This provides other researchers with sufficient information to reflect on the applicability of findings to other contexts than the one studied. In this thesis, the empirical data has been gathered in one context, the online pharmacy programme at Umeå University. Rich, multi-level description is presented of the context in which academic change and development occur, with the aim of providing material that can inform other contexts and guide future research. There may of course be limitations regarding the extent to which the results can be generalised to other contexts. Nevertheless, the questions explored are likely to be applicable for other HE institutions in Sweden and internationally that share some features with the academic context of the pharmacy programme.

Dependability

The conventional equivalent of dependability is reliability which is concerned with establishing whether findings are stable, consistent, predictable and replicable (Lincoln & Guba, 1985). However, in interpretivist studies the question of whether the results are consistent with the data collected is of greater importance (Merriam, 2009). Several strategies to increase dependability are triangulation, peer review and audit trail. Triangulation and peer review have been addressed earlier, therefore the generation of an audit trail will be discussed. An audit trail is a record of the data collection and analysis process and decisions

made throughout the thesis (Merriam, 2009). Data collected throughout the longitudinal research process, such as original recordings, transcripts, photographs and digital presentations from the Change Laboratory intervention have been kept and stored digitally.

Confirmability

Confirmability is the equivalent of objectivity in conventional research (Guba & Lincoln, 1994). The disclosure of beliefs, assumptions and expectations by the researcher and the use of reflexive commentary describing changes of perspectives are two of the strategies adopted in this thesis to ensure confirmability. In 2004 when collection of empirical material began I was not enrolled as a PhD student but my role was that of educational technologist involved in the development and evaluation of the online pharmacy programme. The questions investigated in the earlier interviews with teachers (2004 and 2008) arose out of a desire to improve the quality of student learning on the programme. Gradually as the research questions and results of the studies have developed over time, new questions have emerged and the focus of the thesis has changed; from Edtech to a more general focus on academic change and development, and from an individual perspective to a wider holistic view of change and development processes on micro-, meso- and macro-levels. This iterative process has been influenced by discussions with both colleagues and with the teachers on the pharmacy programme. Through the process of peer-review and discussions with colleagues I have had the opportunity to reflect upon my perspectives and interpretations and have had the opportunity to examine the role played by my previous experience in shaping the research process, challenging and questioning my assumptions.

Ethical considerations

In ethical considerations in social research, areas of ethical concerns are lack of informed consent, invasion of privacy and deception and harm to participants (Cohen et al., 2011; Swedish Research Council, 2011). The teachers and management in this thesis were provided with full information concerning the purpose of the research, data collection methods and the way in which the results would be presented. They were provided with an information sheet concerning the purpose of the study prior to participation in interviews and the Change Laboratory intervention and gave their written consent for the data gathered to be used in this thesis. The information sheet also contained information concerning confidentiality and anonymity and the option to withdraw their participation. When transcribing interviews, participants were anonymised by allocating numbers and/or letters (Cohen et al., 2011). Data resulting from collation of student surveys did not require anonymising as surveys were submitted namelessly.

The thesis fulfils the ethical requirements and standards outlined by the British Educational Research Association (BERA) (2011) and also the requirements of the Swedish Research Council (SRC) (2011). In the data collection process I have been aware of these ethical principles and tried to show respect in the portrayal of individuals and their information as well as for other information involved.

My role as researcher

In this thesis I have researched the activities and a context of which I myself am a part. As an educational technologist, academic developer and research student, I have tried to be aware of my prior knowledge and experience of teaching and learning with Edtech and of my position as an academic developer at the university Centre for Educational Development. This prior experience, gained over fifteen years of working with online teaching and learning, involves both possibilities and challenges. Possibilities include easy access to the study object and participants, while challenges include maintaining objectivity and lack of bias. I am myself part of the teaching culture of the institution and my experience of both teaching and learning and Edtech provides me with insight into both worlds, which to some degree makes it easier to understand the motives and perspectives of the teachers involved in the research. As a researcher, I cannot be entirely objective in my choice of questions, respondents, methods and analyses and interpretations being a part of the context studied. Although as Cohen et al. (2011) point out, knowledge of the context is at the heart of qualitative research. I therefore consider my being part of the context as an advantage, providing insights and cultural knowledge that have helped in the interpretation of data. Nonetheless, as pointed out by for example Hammersley and Atkinson (2007) my own perceptions and expectations may influence analysis of data and bias may arise from "over-rapport" with interviewees (p. 87). Throughout the research process I have continuously sought to maintain a reflexive position, being open and honest about my pre-knowledge and biases rather than claiming objectivity (Hammersley & Atkinson, 2007; Lincoln & Guba, 1985).

5. Extended summaries of papers

This chapter comprises extended summaries of the five papers included in the thesis. The five papers explore and analyse academic change and development at different levels: Papers I and II at explore individual factors at micro-level, paper III covers meso- and macro-level contextual factors and papers IV and V examine collaborative change and development at meso-level. Together they contribute to a deeper understanding of the factors that influence academic change and provide insight into factors that may be relevant in the design of academic development activities to support teachers and managers in the enhancement of teaching and learning.

Paper I

Englund, C., Olofsson, A. D., & Price, L. (2016). Teaching with technology in higher education: understanding conceptual change and development in practice. *Higher Education Research & Development, 36*(1), 73-87.

The aim of this paper was to explore change and development at micro-level, exploring how Higher Education (HE) teachers' conceptions of and approaches to teaching and learning with educational technology (Edtech) change and develop over time. The main empirical data derived from a 10-year longitudinal study (2004-2014) examining teachers' conceptions of and approaches to teaching and learning with technology. Nine teachers on an online pharmacy programme situated at a university in northern Sweden were studied using a mixed-method approach. Semi-structured interviews with the respondents were analysed using the conceptions of and approaches to teaching (CAT) categories developed by Trigwell et.al. (1994) as a framework to identify respondents' approaches to teaching and any changes occurring. To provide an indication of student satisfaction with the quality of teaching on the program and changes over time, annual student course evaluations were used as a second source of empirical data.

An important finding in this paper was that conceptual change occurred for the majority of the respondents but to varying degrees. Where change did occur, it was long-term and gradual. Some respondents displayed no change over the 10-year period and seemed to consider their teaching approach to be adequate and not requiring change. For change to occur, it can require powerful new influences such as the introduction of new technologies or economic constraints to challenge pedagogical inertia. For others, the opportunity to take part in developmental projects provided the pedagogical impetus for change and for some the desire to improve their pedagogical skills was sufficient.

Another finding was that novice teachers demonstrated a greater degree of change. Although they initially had a more teacher-focused approach than other respondents, they were able to develop and change more rapidly than experienced colleagues. A conclusion is that focusing professional development activities on novice and early career academics as they enter the profession is likely to lead to a more lasting and progressive impact on the field. There is also a pressing need to support the development of experienced teachers who already have a deeply entrenched, frequently teacher-centred teaching approach. Teacher professional development is needed to support conceptual change and improve the use of Edtech for both categories. Further, with regard to the integration of Edtech, conceptual change is a central component of academic development activities. Developing teachers early in their teaching career is therefore an important factor as they are more pre-disposed to changing their conceptions of teaching with technology toward student-centred learning.

The influence of underlying conceptions and approaches to teaching and learning on Edtech use in HE became apparent in paper I, as revealed in participant interviews. Where teachers displayed a student-focused approach to teaching, the use of communicative, collaborative technologies was more common, while a more teacher-focused approach generated the use of more transmissive technologies. This raised further questions concerning the design of learning activities supported by Edtech, leading to the second research question considered in paper II.

Paper II

Englund, C. (2017). Exploring approaches to teaching in three-dimensional virtual worlds. *International Journal of Information and Learning Technology*, *34*(2), 140-151.

The aim of this paper was to explore how HE teachers' approaches to teaching and conceptions of teaching and learning with educational technology influence the implementation of three-dimensional virtual worlds (3DVW) in healthcare education. Data was collected through thematic interviews with eight online teachers to elicit their approaches to teaching in a 3DVW environment and their conceptions of teaching and learning with technology.

The findings illustrate a number of themes contributing to the respondents' teaching approaches and underlying conceptions of teaching and learning with educational technology and 3DVWs. These themes included: approaches to teaching and conceptions of teaching and learning in 3DVWs; rational for using a 3DVW; design of learning activities; disciplinary fit; attitudes to teaching and learning with educational technology and 3DVWs. The analysis in this paper

indicated that a pre-requisite for teaching in 3DVWs is the adoption of a student-centred approach to teaching. The teachers' underlying conceptions of teaching and learning became evident in their student-centred approach and use of problem-based activities. The immersive, social nature of the environment facilitated the creation of authentic, communicative learning activities created by the healthcare teachers and was in alignment with their disciplinary approaches to teaching and learning.

A conclusion that can be inferred from this paper is that the pedagogical implementation of educational technologies, and in particular 3DVWs, requires a more student-centred approach to teaching if the possibilities offered by digital technologies are to be realised. The change in the nature of the teaching environment necessitates a corresponding change in approaches to teaching and conceptions of teaching and learning, towards a more student-centred, communicative approach with corresponding strategies for the design of learning activities. As a consequence, academic development activities may be necessary to support teachers' conceptual change and improve the use not only of 3DVWs but also of Edtech in general. Further, the influence of the disciplinary approach and teaching culture of the department should also be taken into consideration; academic development activities that involve not only individual teachers but also the communities of practice within which they act are needed. Thus, when implementing 3DVWs, the approaches to teaching of the teachers and their disciplines must also be considered if the affordances offered by 3DVWs are to be realised. The question of disciplinary differences is further explored in paper III, where meso-level differences between departmental and disciplinary teaching cultures were found to impact on the opportunities for change and academic development of the teachers.

Paper III

Englund, C., Olofsson, A. D., & Price, L. Teaching in higher education: contextual factors as facilitators of conceptual change and development in practice. Under review, (submitted to *Higher Education*).

Building on findings from papers I and II, this paper explored the working environments of teachers on an interdisciplinary online pharmacy programme, investigating contextual factors at meso- and macro-level that may facilitate or impede conceptual change. In total, 47 semi-structured interviews were carried out with 24 teachers at five points over a 12-year period: 2004, 2008, 2011, 2014 and 2016. A mixed methods approach was used where interview data were combined with document analysis to provide contextual data concerning: departmental teaching culture, teachers' conceptions of teaching and learning, institutional policy and strategy and national quality evaluation policy. The

interview data and contextual data were analysed within a Cultural-Historical Activity Theory (CHAT) framework. This sociocultural framework enabled an examination of how teaching practice at the micro level of the individual is related to the meso level department and programme context and the macro level institutional context.

CHAT analysis made visible relationships between the individual's activity, the systems of activity within which the individuals act, and the factors of influence within them. Analysis of interview data revealed the teachers' conceptions of teaching and learning and the contextual factors perceived as contributing to conceptual change. These included departmental teaching cultures, collegial support and institutional policies and strategies. Content analysis of documents concerning structural factors facilitated an understanding of the context, enabling examination of how the different departments involved in the programme mediated the activity by interpreting and enacting institutional policies. The longitudinal nature of the study also allowed the identification of changes over time and an understanding of the historical roots of specific issues.

Distinct differences in the teachers' sociocultural context were identified which in turn influenced possibilities for conceptual change and development. Departmental teaching cultures and patterns of communication were found to influence practice both positively, by offering collegial support and negatively, by impeding change. Building on findings from paper I, almost all of the teachers in the study developed their conceptions of teaching and learning over time, however teachers belonging to more collaborative departments demonstrated a greater degree of conceptual change. This would seem to indicate that the sociocultural context of these teachers encompassing support from the community and mediating tools for communication facilitates opportunities for change and development. The findings have significance for academic development strategies, indicating a need for departmental level support that promotes reflection and development in conceptions of teaching and learning.

Building on these findings, papers IV and V explored the use of an interventionist, meso-level academic development activity to strengthen collaboration and communication within the teaching team of the online pharmacy programme.

Paper IV

Englund, C. Exploring interdisciplinary academic development: the Change Laboratory as an approach to team-based practice. (Accepted for publication in *Higher Education Research & Development,* January 2018).
This paper describes a team-based academic development activity at meso-level aimed at developing more coherent student experiences of an interdisciplinary

programme by resolving pedagogical, organisational and structural tensions. A further aim was to investigate how a development activity involving collaborative expansive learning can serve as a model for team-based interdisciplinary academic development in HE. The activity is in the form of a Change Laboratory; a formative intervention method that builds on the theoretical framework of Cultural-Historical Activity Theory (CHAT). Twelve teachers from different disciplinary and departmental backgrounds, who were all teaching on an interdisciplinary online pharmacy programme in northern Sweden, took part in the Change Laboratory over a period of five months. During the intervention, which consisted of nine sessions of 90 minutes each, sessions were video-recorded and the recordings of activity during the intervention sessions were used as observational material in the analysis of interactions and discussions between participants. Semi-structured follow-up interviews were carried out with six of the original Change Laboratory participants after two years.

Results showed that the Change Laboratory shaped the participants' analysis and collaborative development of curriculum coherence in the online pharmacy programme by providing an opportunity to analyse contradictions within the programme and to visualise solutions. During the process, they were able to begin work on resolution of pedagogical, organisational and structural tensions through a team-based approach to academic development. This team-based approach using the Change Laboratory intervention provided a neutral forum for discussion of the needs and development of the programme across departmental boundaries. Participants were able to analyse and discuss the programme in an interdisciplinary forum not available in previous academic development initiatives at the micro-level of the individual teacher.

Paper V

Englund, C., & Price, L. Facilitating agency: the change laboratory as an intervention for collaborative sustainable development in higher education. Under review (submitted to *International Journal for Academic Development*).

As a further development of paper IV, the aim of this paper was to investigate whether a Change Laboratory intervention involving collaborative, expansive learning can promote agency in participants and is an applicable, sustainable method of academic development in higher education. The activity is in the form of a formative intervention method, the Change Laboratory, that builds on the theoretical framework of CHAT. The intervention was carried out with a group of twelve teachers from an online interdisciplinary programme in spring 2014. The intervention consisted of nine video-recorded sessions, lasting approximately 90 minutes, including a follow-up session two months later. The nine video-recorded sessions were transcribed and analysed. Speaking turns containing expressions of transformative agency were analysed in detail using a category framework to

investigate discursive expressions of transformative agency in conversations among participants. Semi-structured follow-up interviews were carried out with six of the original Change Laboratory participants after two years to investigate the sustainability agency.

The results of this study seem to indicate that the development of transformative agency is collaborative and communicative. Actions and expressions of agency emerge when participants are given the opportunity to analyse, envision and redesign their practice collaboratively with the help of mediating conceptual tools. There is therefore a need to offer academic development activities at meso-level that provide a neutral space for discussion and criticism of current practices and that support the development of transformative agency. In advancing interdisciplinary programmes, the opportunity to work together as a team to collaboratively construct and develop practice, is necessary to provide a chance to form group coherence and to build trust and mutual respect among members.

6. Analysis and discussion

The main findings and contributions of the thesis from the perspective of the four research questions (p. 4) are discussed and elaborated on, followed by a discussion of the overall aim and the implications of the results for academic development. A framework for future scholarly approaches to academic development in teaching and learning in HE is presented and discussed, based on the Scholarship of Teaching and Learning (SoTL). The chapter ends with some reflections on the thesis' contributions to knowledge, concluding remarks and suggestions for future research.

General discussion of research questions

How can individual higher education teachers be supported to facilitate academic change and development?

Within the overall aim to explore factors influencing academic change and development, paper I in this thesis concerns more specifically change and development at micro-level, exploring teachers' conceptions and approaches to teaching with Edtech over time. An important insight revealed in the paper was the variation in the degree of change among the teachers, ranging from no change to development from a teacher-focused approach to teaching to a student-focused approach. Results indicated that a contributory factor could be the teaching experience of the participants in the study; those who developed to the greatest degree were novice teachers and those who did not change were teachers with extensive experience of teaching. This would seem to imply that novice teachers are more malleable in terms of their ability to re-appraise and change conceptions and approaches to teaching (Cheng et al., 2015). Particularly with regard to the use of Edtech, having no preconceptions of either the role of the teacher or previous models of teaching to compare with would seem to be an advantage (Sang, Valcke, Braak, & Tondeur, 2010; Stein, Shephard, & Harris, 2011). As suggested by Postareff, Katajavuori, Lindblom-Ylänne and Trigwell (2008), dissonance between prior more traditional teacher-focused approaches to teaching and the desired student-focused approach of teaching with Edtech could impede change and the development of new teaching practices (see also Prosser et al., 2003; Vermunt & Verloop, 1999). Changing the approaches to teaching of experienced teachers would appear to be more difficult (Ertmer, 2005) and may reflect a greater focus on research than on teaching by senior academics or on a lack of incentive to invest time in developing a more student-focused approach to teaching (Cretchley et al., 2013). The variation in change and development observed in this paper raised questions concerning further possible factors

involved in the change process. To gain a deeper insight into this question contextual factors were explored in paper III. This revealed additional factors influencing conceptual change, such as the sociocultural and structural context of the participants.

The gradual pace of change, even for those participants with the greatest degree of conceptual change, was thought-provoking. A great deal of the research into approaches to teaching with technology are snapshots in time (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurer & Sendurer, 2012) or alternatively investigate the impact of relatively short academic development activities on approaches (Cilliers & Herman, 2010). The results of paper I revealed the advantages of taking a longitudinal perspective when exploring change and development in conceptions and approaches. It became evident that effecting change would seem to take time (Postareff, Lindblom-Ylänne, & Nevgi, 2007) and an implication of this for academic development is that activities need to be sustained over longer periods, for example programmes rather than seminars or workshops if conceptual change is to be achieved (Chalmers & Gardiner, 2015; Trigwell, Caballero Rodriguez, & Han, 2012).

Despite the proposed transformative possibilities of Edtech discussed in Chapter 2, the importance of the teachers' underlying conceptions and approaches to teaching and learning on the use of Edtech in HE became apparent in paper I. A student-focused approach to teaching was seen to give rise to the implementation of communicative, collaborative technologies such as Wikis and 3DVWs by teachers on the programme, while a more teacher-focused approach generated the use of transmissive technologies such as pre-recorded lectures and power-point presentations delivered online. This raised further questions concerning the impact of conceptions and approaches to teaching on the design of learning activities supported by Edtech, leading to the second study, paper II.

In paper I, the underlying conceptions and approaches to teaching and learning of the teachers were seen to have major consequences for how Edtech is used to organise and facilitate learning. The second study, paper II, explored the influence of the individual teachers' approaches to teaching at micro-level on the design of learning activities in relation to the use of 3DVWs. Findings revealed that the immersive, communicative nature of 3DVWs necessitates a student-focused approach to teaching and learning. In interviews, the teachers suggested that colleagues not having a student-focused approach would be unable to adapt to the requirements of this particular Edtech, since it would be challenging to use it in a transmissive manner (De Freitas & Veletsianos, 2010). In 3DVWs the teachers' position is that of a facilitator and indicates a shift away from the traditional role of teacher as lecturer and transmitter of knowledge (Savin-Baden, 2010a). The necessity of a shift in the role of the teacher in teaching with Edtech,

from purveyor of knowledge to facilitator of student learning, has been the focus of research in the field for two decades (Baran, Correia, & Thompson, 2011; Bennett & Lockyer, 2004; Berge, 2008). In relation to the use of Edtech and online teaching, it has frequently been discussed in terms of the teacher needing to change roles and consequently teaching strategies, rather than being a question of expanding underlying conceptions and approaches to teaching and learning. This perspective implies that teachers must 'undo' their existing conception of teachers as transmitters of information and 'redo' it to accommodate a facilitative role (Donnelly, McGarr, & O'Reilly, 2011; Lim & Chan, 2007). In contrast, from the perspective of the CAT framework, change and development is a process of the expansion of conceptions and approaches from a focus on the teacher to also encompass a focus on the conceptual development of the student (Trigwell & Prosser, 1997).

Another insight relating to paper II was the influence of disciplinary teaching culture. Teaching practice is shaped both by the teachers' individual approach to teaching and by the teaching culture of the discipline to which they belong (Kreber, Brook, & Policy, 2010; Shulman, 2005; Trowler & Cooper, 2002). The teachers in this paper all had a background in healthcare professions, either as nurses or pharmacists, working in departments with a strong focus on teaching rather than research. Their approach to teaching was student-focused building on underlying concepts of problem-based learning and authentic practice-based learning; the use of 3D virtual worlds was very much in alignment with their current teaching practice (see also Conradi et al., 2009). The translation of disciplinary traditions and approaches that teachers bring into their use of Edtech is complex. Design decisions need to reflect the underpinning approaches and conceptions of teaching and learning of the discipline and aid in promoting disciplinary values (R. A. Ellis, Hughes, Weyers, & Riding, 2009). The question of disciplinary differences is further explored in paper III, where the meso-level departmental and disciplinary teaching cultures were found to impact on the opportunities for change and development of teachers.

What sociocultural and structural contextual factors support or hinder change and development in higher education academic practice?

Following on from papers I and II, the second research question explores contextual factors influencing teachers' possibilities for academic change and development. Specifically, this question aimed to achieve a deeper understanding of the impact of sociocultural contextual factors such as the influence of disciplinary and departmental teaching cultures at meso-level and structural contextual factors such as institutional policy and ideology at macro-level.

CHAT analysis of the activity systems of the departments made possible the identification of inherent systemic contradictions and how these contradictions influenced the teachers' possibilities for change and development. The longitudinal nature of the study also allowed the identification of changes over time. One contradiction frequently voiced by teachers on the online pharmacy programme was the conflict between the strong research focus of some departments and the desire by both individual teachers and the pharmacy programme to provide education of good quality, enhancing student learning. Although the research-teaching nexus is seen by some as a potentially rich source for the development of good teaching (for example, Kane, Sandretto, & Heath, 2004) the analysis revealed that for many of the teachers interviewed in the study the requirement to generate research outputs was described as a constraining factor on academic development. As long as teachers are rewarded for research outcomes rather than teaching achievements, particularly early career academics may be disadvantaged if they focus on teaching. Although this contradiction between research and teaching was most clearly evidenced in the sociocultural context of the department, the structural context is set by the institution indicating what is valued through policy and strategy directives. These directives influence academic discourse and set the tone for teaching and research (Cretchley et al., 2013; Quinn, 2012). Nonetheless, institutional policies are interpreted by the departments (J. J. Lee, 2007; Price et al., 2016) where the local community interprets and mediates policy into practice (Clegg & Bradley, 2006).

Of relevance for this thesis is also the influence that discourse around teaching within the department has with regard to enabling or constraining academic change and development. Departmental communities can influence teaching practice positively by providing collegial support in development processes, or negatively by, for example, discouraging participation in academic development activities (Leibowitz, 2015; Van Schalkwyk et al., 2015). Consequently the structural framework of the institution impinges on the teachers' possibilities for change and development through local discourse where institutional policy is negotiated by the local community (Kaatrakoski et al., 2016). Recognition and reward in relation to teaching and academic development were seen to have a positive influence on the uptake of academic development activities (see also Leibowitz et al., 2014). In this study, the inclusion of teaching as a criterion at employment and the recognition of teaching excellence by the institution over the past five years was seen to have contributed to a gradual change in attitudes, if not as yet in practice.

In the exploration of change in conceptions and approaches to teaching in paper I, variation in the degree of conceptual change by teachers was detected. An initial conclusion drawn from this was that teaching experience was a significant factor in academic change and development, where greater flexibility and development

was seen in novice teachers. However CHAT analysis of contextual factors revealed the complex interaction between micro-level individual factors, meso-level sociocultural factors and macro-level structural factors. Distinct differences were identified in the sociocultural environment of the departments involved in the online pharmacy programme, which in turn influenced possibilities for conceptual change and development. Despite the commonality of the structural framework, institutional policy directives were interpreted differently by the three departments involved in the online pharmacy programme. In departments where the research focus of the institution was mirrored in the local culture, teachers experienced a contradiction between research and teaching, for example in the status awarded research and allocation of resources to teaching. However, where policy directives were interpreted, negotiated and realigned by the departmental community to fit desired conceptions of practice, contradictions were fewer. An important mediational tool in the solution of contradictions, i.e. the interpretation of policy and facilitation of solutions, was seen to be communication and dialogue among members of the community. The sociocultural context of the teachers in paper I who changed and developed the most were found to encompass both support from the community and mediational tools for dialogue and reflection which facilitated opportunities for change and development. In contrast, in departments where there was little communication and discussion concerning teaching and learning, academic change and development among members did not occur to the same degree. Lack of opportunities for communication and dialogue within the community would seem to inhibit the resolution of contradictions and development of practice.

In order to explore how programme teaching-teams or departmental teaching communities can be supported to collaboratively resolve the conflicts revealed in paper III, an interventionist method, the Change Laboratory was used in papers IV and V to investigate the third research question.

How can higher education teachers be supported to collaboratively change and develop academic practice as a group?

To explore possibilities for collaborative academic change and development at the meso-level of the programme teaching team a Change Laboratory intervention was initiated. In contrast to the other studies in the thesis, the Change Laboratory was a formative intervention that focused on facilitating change and development and expanding the agency of the teachers as a group (see also Bronkhorst, Meijer, Koster, Akkerman, & Vermunt, 2013; Engeström & Sannino, 2010). In the intervention the teachers were able to collectively examine current practices within the context of the programme, historically analyse experienced contradictions and collaboratively formulate solutions. Some of the contradictions experienced within departments in paper III, such as lack of

communication, were echoed in this process. However, a deeper, historical analysis of the online pharmacy programme by the teachers also revealed systemic contradictions. As a consequence of the interdisciplinary structure of the programme entailing three departments, the programme organisation is complex. During the Change Laboratory intervention contradictions emerged, visible as lack of coherence and sequencing between course modules. The longitudinal perspective of the thesis made it possible for the teachers to seek the historical roots of current contradictions in an effort to develop possible solutions.

One of the outcomes of this intervention, illustrated in paper IV, was the insight that contradictions between the activity system of the programme at meso-level and the macro-level institutional activity system were a barrier to the development of the programme. In the case of the online pharmacy programme, analysis of contradictions by the teaching-team revealed the need for a new way of organising and managing the programme. The solution proposed by the teaching-team was not, however, in alignment with the established structures and regulations required by the institution. As a result, the potential for change and development of the programme was limited by institutional structures.

The interventionist approach of the Change Laboratory was nonetheless successful in achieving change and development within some areas of the programme, for example increased communication and collaboration among teachers and coordination of course modules over the programme. Above all, the team-based approach to change and development provided by the Change Laboratory provided a neutral forum for critical discussion of the needs and future visions for the programme across departmental and disciplinary boundaries. In interdisciplinary programmes the coordination and collaboration of participating teachers should be an ongoing process; members of the teaching team frequently change and new teachers enter the programme without previous knowledge of the programme's ideologies and aims. This interdisciplinary collaboration is generally considered essential during the development phase, or when introducing new ideas or Edtech, however it also needs to be an ongoing activity throughout the lifespan of the programme, providing a collaborative understanding of practice and emphasising the necessity of joint responsibility in maintaining and developing the programme over time.

Paper V explored a further outcome of the Change Laboratory, the facilitation of collaborative agency among the teachers who participated in the intervention. As discussed briefly above, in order to achieve sustainable change and development within the programme it is the teachers themselves who need to play an active, agentic role in development activities by questioning, analysing and shaping their own practices. The need for teacher agency in the rapidly changing educational

environment of HE is generally accepted in educational research (Toom, Pyhältö, & Rust, 2015). However, agency as conceptualised within the framework of CHAT differs from conventional conceptions of agency in that it goes beyond the individual to encompass collective change efforts in envisioning new ways of working. The collective nature of the agency developed by the teaching-team of the programme emerged in the collaborative analysis, envisioning and redesign of their practice. To facilitate collective agency a neutral space would seem to be necessary, providing opportunities to discuss and criticise current practices in a neutral forum.

Nonetheless, teachers' expressions of collaborative agency at meso-level are facilitated or restricted by both individual factors at micro-level and meso- and macro-level contextual factors. These factors can include individual conceptions and approaches to teaching and learning, the internalised or experienced norms, culture and practices of the community to which they belong and the structural policies and directives of the institution. The facilitation of agency promoting change and development therefore needs to adopt a holistic strategy taking into account all of the levels involved.

How can academic change and development in higher education be understood from a scholarly perspective?

The findings of the five papers included in the thesis all have implications for academic change and development in HE. Changes in education and in society necessitate the development and adaptation of teaching and learning practices in HE (Kirkwood & Price, 2006). To support the enhancement of student learning, academic development activities that embrace multiple levels are needed. Papers I and II indicated that academic development activities that support individual teachers at micro-level, facilitating conceptual change and development, are necessary to promote both an increased focus on student learning and to facilitate the use of Edtech for both novice and experienced teachers. Paper III indicates that teaching practice is strongly influenced by the sociocultural context of the department or programme at meso-level. Activities that support and facilitate discussion and reflection concerning the local teaching and learning culture and establishment of communicative networks are therefore to be recommended. Team-work or professional learning communities would seem to be key facilitators of academic change and development. Particularly in interdisciplinary programmes, where course modules are delivered by different departments, changing practices aimed at developing a coherent interdisciplinary programme can add further complexity to academic development activities, requiring neutral spaces for discussion and collaboration. The influence of institutional policy and strategy on change and development at macro-level, as interpreted and mediated by the department, was also seen to influence possibilities for academic change

and development. Institutional directives were found to influence academic discourse within the departmental community, setting the tone for teaching and research practice.

Although many institutions have responded to the changing educational environment of HE by implementing a wide range of academic development activities aimed at improving teaching and learning quality, many of these initiatives have focused only on the development of the individual teacher at micro-level (Chalmers & Gardiner, 2015; Gibbs, 2013). A further potential problem with current academic development initiatives is that they are frequently instigated by management as a solution to a perceived problem or in response to performance targets, applying a deficit model of development (Ball, 2012; Chalmers, 2011; J. Murray, 2012). This approach does not, however, promote the agency and the engagement of participants in cooperative development activities (Garet et al., 2001; Voogt et al., 2015). On the contrary, it frequently results in lack of engagement or rejection of the initiative by teachers (März & Kelchtermans, 2013; Vähäsantanen, 2015). Academic development activities at meso-level such as the Change Laboratory applied in papers IV and V (Virkkunen & Newnham, 2013), which mediate communicative spaces within which to work and a collaborative climate of development among the community's teachers are therefore suggested. In order to envision and implement sustainable academic development, teachers need to play an agentic role, developing the ability to question, analyse and shape their own practice (Haapasaari et al., 2016; Sannino et al., 2016).

Taking into account the combined analysis of the five papers in this thesis, it becomes apparent that change and development in HE is influenced by factors at multiple levels: the micro-level of the individual teacher, by contextual sociocultural factors at the meso-level of the department or programme and by structural contextual factors at the macro-level of the institution. An academic development strategy that integrates all three levels would seem to be necessary to facilitate change and development in practice and to improve the student learning experience. The findings suggests that the adoption of a Scholarship of Teaching and Learning (SoTL) approach, implemented at all levels of the organisation, could be a powerful approach to academic change and development in HE.

SoTL as an epistemology for enhancing practice has great potential, placing academic development in a non-deficit paradigm where the focus is on systematic, reflective exploration of practice in context (Hutchings, Huber, & Ciccone, 2011). Further, it shifts the emphasis from a focus on product, for example publication, to a focus on process, for example how teaching practice can be changed through inquiry, discussion and experimentation. In particular SoTL

enables an examination of HE teaching practice from a more holistic perspective, introducing initiatives that are long-term and coherent across the university. However, to enable this coherency it is necessary to look at the micro-level context of the individual teacher, the meso-level context of the department or programme, the institutional context at macro-level and the interactions and interdependencies between these. Building on a heuristic framework developed by Price et al. (2016), this thesis illustrates the elements of and relationships between these concepts in a model. Figure 5 models a SoTL approach that can underpin a scholarly approach to academic change and development in HE.

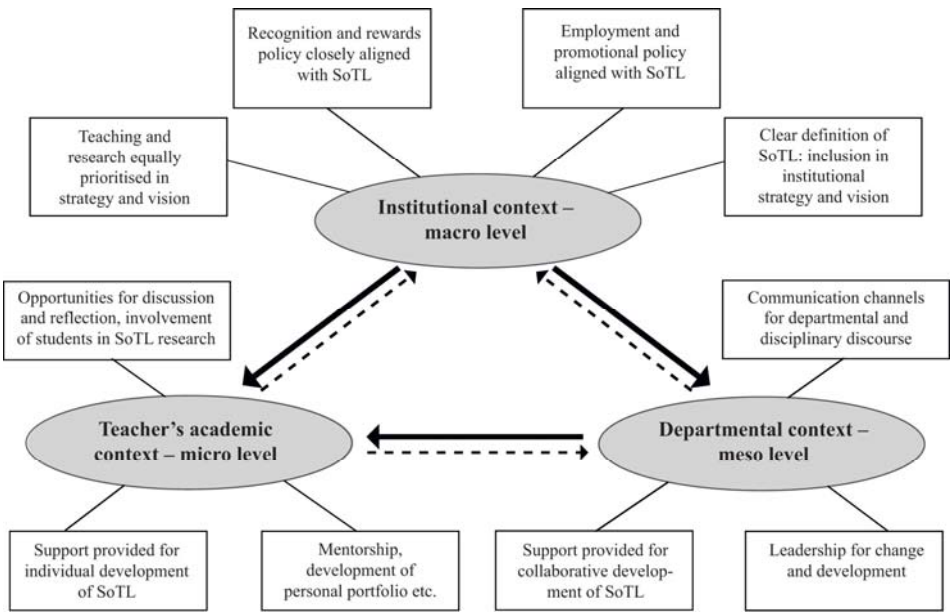

Figure 5. SoTL model of academic development (adapted from Price et al. (2016)).

The model illustrates how a scholarship of academic development model can act on all levels of practice. SoTL underpins a review of practice at the micro level of the individual by supporting teachers in the critical examination of teaching with the purpose of improving student learning (Chalmers, 2011; Lindberg-Sand & Sonesson, 2008; Trigwell, 2013). However, while SoTL work at the individual level of practice is important, the role of the department or programme in mediating change and development is essential. At the meso-level of the department, SoTL can be employed to develop sustainable support networks for teachers in the form of communities of practice (Felten, 2013; Wenger, 2000) and to engage in collaborative development activities. Regardless of the particular

strategy adopted, SoTL emphasises collaboration and discussion with colleagues, creating a shared understanding of practice. Institutional support at macro-level is critical to the success and sustainability of academic development activities carried out at micro- and meso-level. The recognition and reward of teaching excellence can act as a significant tool in the promotion of quality in teaching and learning and the enhancement of the status of teaching (Chalmers, 2011). The effects of rewarding teaching excellence are greater when integrated into an overall institutional SoTL strategy, where SoTL at institutional level is clearly articulated and where SoTL criteria are included in job descriptions and in promotion criteria (Marcketti, VanDerZanden, & Leptien, 2015). The implementation of SoTL at the macro-level of the institution requires the integration of academic development activities at all levels in order to link SoTL to quality in teaching and learning (Hutchings et al., 2011), with or without Edtech.

This model charts the interrelationships established in the thesis between levels of practice. It is presented as a framework for underpinning future scholarly approaches to academic development in teaching and learning in HE. Adopting this kind of approach engenders holistic institutional development that embraces the eco-systems present in higher education institutions. It highlights the importance of understanding how innovation in teaching and learning *requires* support and development at a range of levels. It also heightens the importance of collaboration and seamless coordination between initiatives at micro-, meso- and macro-level.

Concluding remarks

The overall aim of this thesis was to explore factors at micro-, meso- and macro-level that influence academic change and development in a HE teaching and learning environment supported by Edtech. A further aim was to contribute to a deeper understanding of the academic development activities necessary to support teachers and managers in the development of teaching and learning, both with and without Edtech. Drawing on CAT and CHAT the thesis has explored change and development at the micro-level of the individual, the meso-level of the department or programme and the macro-level of the institution and the interplay between the three levels of practice.

The main contribution of this thesis lies in illustrating the importance of the adoption of a holistic approach to understanding academic change and development higher education, taking into consideration factors at micro-, meso- and macro-level and the interrelationships between these factors. The studies have demonstrated not only how support is needed at each level of practice but also the importance of collaboration and seamless coordination between

initiatives at micro-, meso- and macro-level. Change and development are an omnipresent feature of the HE teaching and learning environment today. To provide the necessary support for teachers and students a coherent, institutional approach is necessary that promotes a scholarly approach to teaching and learning, taking into account all levels of practice.

Future research

The conclusions drawn from the studies carried out within the thesis also have implications for future research. The interrelationships between the factors discussed at different levels is implied and needs further investigation. The interrelationship between micro- and meso-level change and development was explored in paper III, and to some extent the degree to which macro-level policy and strategy influence meso-level practices. However further exploration of how institutional policy is interpreted by teaching communities and conveyed to individual teachers is needed.

The adoption of a holistic, institutional approach to academic development also raises questions concerning leadership at macro- and meso-levels. Research into the support needed by institutional management in the implementation of integrated academic change and development processes is sparse. Further, the role of local leaders at the meso-level of the department or programme in supporting the creation of academic communities is not widely researched and would benefit from further exploration.

Finally, exploration of how an interventionist approach, such as the Change Laboratory, can be implemented to facilitate collaborative, agentic academic development is needed. As discussed earlier in the thesis, the local departmental or programme context is a critical space in the change and development of academic practice. Activities at meso-level are needed that provide an arena and incentives to work collaboratively both within and across disciplines to critically examine practice and to enhance student learning.

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Appendix 1: Interview guides 2004-2014

The following are translations of interview questions for teachers on the BSc Pharm programme 2004 and 2008 and the BSc Pharm and MPharm programmes 2011 and 2014.

All interviews contain questions regarding background information: number of years teaching on campus, experience of online teaching, professional development courses etc.

Interviews 2004

Purpose of interview: programme evaluation after first year of delivery of online BSc Pharm.

Respondents: teachers on programme.

- Is there a clear strategy or policy for online teaching & learning at your institution?
- Do you feel that you have received sufficient support in the development of your courses on the online BSc Pharm: from your institution/colleagues/the programme?
- Do you feel that you received sufficient information regarding the form (online) of the BSc Pharm prior to beginning course development? Are you aware of the reasons for an online delivery method?
- In your experience, are there any technical or organisational hindrances to the implementation of online teaching & learning at your institution?
- Do you experience any conflict between teaching and research?
- Have you taught online courses previously? What were your expectations regarding the BSc Pharm? Experiences after one year?
- What advantages/disadvantages do you see with online education, both from the students' perspective and yours as a teacher?
- Do you think you will include digital technologies in your campus courses in the future? Possibilities for further development?
- Did you participate in the PD courses offered by the programme (ICT) before beginning teaching on the BSc Pharm?
- Any other comments?

Interviews 2008

Purpose of interview: programme evaluation after 5 years. Some questions emerged as a result of student focus groups.
Respondents: teachers on programme.

- Do you also have campus courses? If so, what are the main differences/similarities between teaching f2f & online?
- What do you consider most important when planning your courses on the BSc Pharm?
- What do you consider most important when delivering your courses on the BSc Pharm?
- Do you feel that it is important to always be available online?
- In your experience, is the time allocated for teaching online courses sufficient? If you realise that it's not enough what do you prioritise/cut?
- What is your opinion of the students on the BSc Pharm? Are they independent learners or do they need a lot of support?
- Do you feel that you are able to influence the development of the programme as a whole?
- How do you align your course with others on the programme, in particular those immediately prior to and post your course?
- Do you collaborate with colleagues on the programme?
- Does the use of digital technologies influence your teaching in any way? Please explain in what way.
- What advantages/disadvantages do you see with online education, both from the students' perspective and yours as a teacher?
- In your experience, are there any technical or organisational hindrances to the implementation of online teaching & learning at your institution? Factors that could facilitate online courses?
- Do you feel that you need further training/professional development? If so, would that be pedagogical and/or technical competence development?
- Do you have any tips/recommendations for your colleagues on the programme – things that have worked especially well for you?
- Other comments?

Interviews 2010-2011

Purpose: To investigate teachers' experiences of the course development process and first year of teaching on the online pharmacy programme.
Respondents: Teachers on MPharm programme (many also work on BSc Pharm). Interviews more open to discussion of teaching philosophy than 2004.

- Background information: experience of campus teaching & online teaching

- Did you design and develop the course you are teaching on? If so could you describe the process? Do you think the course is successful?
- Do you also have campus courses? If so, what are the main differences/similarities between teaching f2f and online?
- Critical situations in your course- have there been situations where things haven't worked and/or where they have worked excellently?
- What advantages/disadvantages do you see with online education, both from the students' perspective and yours as a teacher?
- In your experience, are there any technical or organisational hindrances to the implementation of online teaching & learning at your institution? Factors that could facilitate online courses?
- Do you think that there is any difference between your role as a teacher on campus and your role online?
- And the students' role – is that any different?
- Do you feel that you need further training/professional development? If so, would that be pedagogical and/or technical competence development?
- Do you collaborate with colleagues in your institution with regard to teaching? Discussions informal or formal about teaching and learning?
- Any other comments?

Interviews 2013-2014

Purpose: To explore the teachers' strategies for the design of online courses. Together with the interviewer, respondents looked at earlier versions of their online courses and compared them with the current version to discuss any revisions or changes in course design and the underlying purpose of these changes.

Respondents: teachers on both BSc and MPharm programmes.

- When you created the course initially did you work alone or as part of a team?
- How much did the LMS structure/templates influence your choice of structure/ICT tools etc?
- Have you made any major changes to your course between 2005 and the present?
- Do you feel that there is more flexibility today? A wider choice of digital tools and possibilities for course design?
- When you created the course, how did you think about the design? Content, activities, examination?
- In what way does the present version of the course differ from your original course?

- Can you explain the communication structure of the course: teacher-student, student-student, student-teacher. Does the course contain collaborative assignments?
- Do you feel that the fact that the programme is online provides new possibilities or is it a hindrance?
- When you began teaching on the programme, did you feel that you had sufficient competence in teaching online? Technical & pedagogical?
- And now? Do you feel that your competence has increased? If so, is it due to experience or have you taken part in academic development courses?
- Do you think that the students have changed over the last 10 years? Has their IT competency increased? Are they more autonomous or less? Any other changes?
- Critical situations in your course- have there been situations where things haven't worked and/or where they have worked excellently? Have these critical situations led to changes in the way you teach?
- Any other comments?

Appendix 2: Interview guide virtual worlds

Purpose: to investigate teachers' use of three-dimensional virtual worlds. Respondents; teachers from the pharmacy programme and nursing programme who use 3DVWs in their courses.

Background information requested from all respondents:

- What is your teaching experience, both online and on campus?
- What type of pedagogical education or academic development courses have you participated in?
- What courses do you teach that use the 3DVW (OpenSim)?

OpenSim

- Can you describe the purpose of the activities you have designed in OpenSim?
- Why did you choose to conduct the activity in Open Sim?
- What possibilities does the virtual environment provide?
- What types of activities do you feel are best suited to the OpenSim environment? Is it suitable for all types of education in all subjects?
- Could you describe your thoughts when you designed the OpenSim activity? Did you have a particular pedagogical philosophy in mind?
- Can you describe your relationship with the students in OpenSim/your role as a teacher? Does it differ from when you teach in the classroom or when you work with the LMS? If so, in what way does it differ?
- Did you have to change your way of thinking about teaching when you started using virtual worlds/OpenSim? In what way?
- Do you feel there are limitations with the environment? Can you describe these?
- Have you experienced any problems/difficulties with teaching in the OpenSim environment? Can you describe these?
- Do you feel that the students act differently in the OpenSim environment? In what way?
- Can you describe your experience of teaching in OpenSim?
- In what way does it differ from classroom/online teaching with LMS?
- Has teaching in OpenSim influenced how you teach in other courses?
- What characteristics are required as a teachers to utilise virtual environments in teaching?
- Do you think teaching in a virtual environment could be carried out by all teachers/your colleagues at the department? If not why not?

Appendix 3: Interview guide 2016

Change Laboratory
Purpose: to investigate the sustainability of the Change laboratory intervention.
Respondents; teachers who took part in the intervention 2014.

- Have you experienced any concrete results or consequences of Change laboratory over the last two years? If so, can you describe in what way changes have occurred?
- How do you think communication within the programme works, between departments and subjects? In comparison to a few years ago – has it changed in any way?
- In your opinion, has collaboration with colleagues in your own department changed in any way?
- How about collaboration with colleagues who work in other departments involved in the pharmacy programme?
- Do you feel that you now have new tools or ways of solving problems that develop within the programme?
- Could you describe the development work currently taking place within your own subject and within the programme in general?

Departmental context
Purpose: to investigate the departmental sociocultural context of teachers on the online pharmacy programme.
Respondents: teachers from the three departments who work on the programme.

In the context of your own department:

- What is the general attitude of teaching? To research? How would you describe the status of teaching in relation to research?
- Do you see yourself primarily as a researcher or as a teacher or a combination of both?
- What is the general attitude among your colleagues to online education/digital technologies?
- Do you discuss teaching and learning with your colleagues at the department? How often?
- When you discuss teaching and learning, who do you usually talk to? How many colleagues do you discuss with?
- How would you describe the teaching culture of your institution?

- Has the general attitude changed over the last 10 years in terms of teaching and learning?
- Do you feel that you have support from your colleagues in teaching questions? From departmental management?
- Are opportunities for competence development in pedagogy and/or technology provided by your department or the institution centrally?
- Any other comments?